Governor's Task Force on the Seacoast Cancer Cluster

Final Report

A final report on the progress and recommendations of the Governor's Task Force for the Seacoast Cancer Cluster that met from June 2016 to September 2017.

Final Report and Recommendations

The Governor's Task Force on the Seacoast Cancer Cluster (Task Force) was formed in June 2016 to help coordinate communication with policy makers, state and federal agencies and community members who have concerns about the rhabdomyosarcoma (RMS) cancer cluster and potential environmental exposures and help inform them of the state's investigation into these matters. Members of the Task Force were invited (Addendum A) by Governor Maggie Hassan to participate and included elected officials; representatives of the NH Department of Health and Human Services (DHHS), the NH Department of Environmental Services (DES), and the Environmental Protection Agency (EPA); and members of the DHHS Community Advisory Group (CAG) for the cancer cluster investigation. The Task Force was asked to coordinate communications and make recommendations for how best to address the concerns of constituents around the health impacts of environmental exposures in the Seacoast. On assuming office in 2017, Governor Sununu directed the Task Force to continue its work.

The Task Force has met several times since its inception. Minutes and links to presentations are available at https://www.dhhs.nh.gov/dphs/gtfscc/index.htm. A brief summary of the meetings follows:

June 22, 2016 Initial to discuss the roles and responsibilities of the Task Force and to get an overview from DHHS on the investigation into the cancer cluster. During this meeting, it was decided that DHHS would maintain a website to publicly provide information about the Task Force, including meeting agendas, minutes and presentations. It was also decided that the Task Force would meet monthly to hear updates on the DHHS cancer cluster investigation and to review environmental concerns in the Seacoast area (e.g., Coakley Landfill, Schiller Station, Seabrook Station, Naval Shipyard, etc.). The Task Force also discussed the potential to establish subcommittees, as needed, to focus on specific environmental concerns identified as needing further investigation.

July 20, 2016 The EPA presented information on monitoring conducted at and adjacent to the Coakley Landfill and elevated levels of PFCs detected in May 2016 and shared plans to complete additional testing of private wells in the area. DHHS shared that the case investigation questionnaire had been finalized with input from experts at the Centers for Disease Control and Prevention, oncologists, epidemiologists and RMS researchers. DHHS also presented on radiologic monitoring that occurs in the State with emphasis on Seabrook Station-related monitoring and shared that there has been no activity greater than the normal expected background levels other than a brief incident in 2011. Representatives from C-10 Research & Education Foundation, a non-profit organization, presented information on the radiologic monitoring that they conduct related to Seabrook Station and the intended benefits of this approach. They reported there are 15 monitoring sites in Massachusetts and six in New Hampshire. The funding for C-10 is from the state of Massachusetts for their monitoring sites in Massachusetts. New Hampshire monitoring sites are privately funded and voluntary at a cost of $7000 dollars per site. There is no funding from the state of New Hampshire for real-time monitoring outside of the plant itself other than the RadNet sites, the nearest one being in Concord.

September 14, 2016 DHHS presented with an overview of the case investigation protocol they developed and an overview of the clinical and epidemiological information that is known about rhabdomyosarcoma. Members of the Task Force requested DHHS clarify whether a suspected cancer cluster in Waycross, GA had been determined to be a cluster. DES and EPA provided updates on well testing around Coakley Landfill, which revealed no exceedances of NH/EPA standards for PFCs or 1,4 Dioxane. The Task Force determined that a subcommittee focused on Coakley Landfill

be chaired by Mindi Messmer for the purpose of developing recommendations to ensure the protection of residents in the area around Coakley.

October 12, 2016 The Task Force convened to hear presentations from DES on air monitoring around Schiller Station and received reports related to SB93 fuel and Elliot, ME Air Quality Monitoring Study. The Task Force reviewed a letter from the Portsmouth Naval Shipyard regarding their monitoring protocols and discussed whether any further action would be prudent.

November 9, 2016 The Task Force heard the recommendations of the Coakley Subcommittee (Appendix F) and comments from the Coakley Group and Rye Water District. A number of people shared their concerns about a development in Greenland that has private wells and their interest in continuing to have the Task Force work to ensure they are protected from contaminants in their water and in Berry's Brook. DHHS provided an update on the cluster investigation that included outreach underway in New Hampshire and planning with Massachusetts, Maine and Vermont for further outreach. The Task Force agreed to convene on November 16th to codify a set of recommendations for future activities around the DHHS cancer cluster investigation and environmental concerns in the Seacoast. Those recommendations are detailed in the Task Force Interim Report.

December 14, 2016 The Task Force met to discuss and ratify the Interim Report which was then sent to the Governor. Additional subcommittees on the Portsmouth Naval Shipyard and Seabrook Nuclear Power Station were also discussed.

February 15, 2017 The Task Force received an update on the Coakley Landfill from Drew Hoffman of New Hampshire DES and Jim Murphy from the EPA. Concerns were raised regarding Area fisheries especially in Barry's Brook as well as the safety of children near the landfill playing in run off that has tested positive for PFCs. The EPA felt further sampling would be necessary. They reported that were no plans at that time for advisories regarding these two exposures. The Task Force state legislators provided a legislative update. Issues of potential radiation exposure related to Seabrook Station and the Portsmouth Naval Shipyard were discussed and subcommittees were identified for each site. Other topics discussed included public health education, creation of a database and a repository for information and references on issues identified through the work of the Task Force. DHHS reported that they were completing the questionnaire phase of their investigation and would be reconvening the Community Advisory Group when that data was available. Subcommittees on Seabrook Station and the Portsmouth Naval Shipyard were formed chaired by Kelly Halldorson and Dr. Jim Zuckerman respectively.

May 5, 2017 The Task Force heard an update from the Coakley Landfill Subcommittee including the report of a talk by Courtney Cook Carignan, PhD, emphasizing critical health impact of drinking water PFC exposure and heightened concern about that exposure in infants. The Task Force heard a legislative update on HB 484, 431 and 511, all of which represented bills recommended in the Interim Report. DHHS reported on their questionnaire results, a family only meeting with questionnaire participants and affected families, and announced upcoming public session at Rye Middle School to review the report of the summary of findings on the Pediatric Seacoast Cancer Cluster Investigation. The Subcommittee on Air Quality then discussed the Schiller and other Newington power plants. Dr. Underhill, Chief Scientist at DES Air Resources discussed topics including air pollutants and human health, concerns about burning and solvent use in smaller businesses and landfill off gassing. There was recognition that with the likely formation of a commission to take over the work of the Task Force as a result of the passage of HB 484, the Seabrook

and Portsmouth Naval Shipyard Subcommittees would not be able to organize and complete their assessments in time for the final report and dissolution of the Task Force. Therefore, formation of these subcommittees would be a recommendation in the final report of the Task Force.

June 27, 2017 The Task Force heard updates from the EPA and DES as well as the Coakley Subcommittee. EPA reported that they were studying bedrock hydrology. DES reported that the perfluorochemical (PFC) fingerprint in the area surface water was the same as that in in Coakley ground water. Concerns were raised regarding childhood exposure to the water of Berry's Brook in the neighborhoods adjacent to the landfill. Task Force members urged federal and state officials to place warning signs to avoid exposure to PFCs found in high levels in the surface water especially as the summer weather arrives. The Coakley Subcommittee again discussed concerns regarding the Rye and Grove Road landfills. DES reported that all private owners of lined and unlined landfills are now required to complete PFC testing in 2017 and municipalities in 2018. The Air Quality Subcommittee reiterated its concerns about area radiation from Seabrook and the Shipyard; open burning of leaves and trash, diesel exhaust especially at the Greenland truck stop, household heating fuel emissions and methane off gassing from the area landfills. The Task Force then discussed the structure of the final report. There was a concern that the Task Force includes in its final report identification of additional resources and revenue that might be needed to accomplish recommended interventions. Several members of the Task Force expressed the need to create a final report that would provide enough information to allow the statutory legislative commission to move forward seamlessly on the work started by the Task Force. The Task Force also expressed a desire to include findings and recommendations of those working on PFC exposure at Pease since this was identified by the public as an area of concern in the DHHS investigation of the cancer cluster.

August 16, 2017 The Task Force again heard updates from the Jim Murphy of the EPA on Coakley. He reported further residential well testing to occur in September. There was also to be a meeting with the CLG in September. The EPA responded to a letter from the Hampton select board on August 16 and a copy of the response was to be provided to the Task Force. Mike Wimsatt of NH DES also reported regarding Coakley. The Task Force discussed reliability of PFC testing and lab certification. There was also a discussion of medical monitoring for those exposed to PFCs at Pease. Stefany Shaheen, Kim McNamara and Dr. Ben Chan of NH DHHS agreed to work on language for Pease recommendations.

September 6, 2017 The Task Force heard from members of the public regarding their concerns. Stefany Shaheen, Task Force and Pease Community Advisory Panel member, reviewed the history of the Pease water contamination and suggested recommendations for the Task Force to consider for the final report. Dr. Zuckerman, member of the Task Force and the Portsmouth Naval Shipyard subcommittee, reviewed available information provided by the Navy.

September 27, 2017 The Task Force held a work session to complete all components of its final report except that regarding the Coakley Landfill. This was to be completed at the next meeting on October 4, 2017.

October 4, 2017 The Task Force heard from Jim Murphy of the EPA that the EPA's addendum to the 5 year review was complete and available. He will send this to the Task Force for review. Concerns were raised by members of the Task Force and public alike regarding the summarized findings of the EPA expressed in the addendum. Mr. Murphy stated that these findings do not preclude a determination in the future that further remediation at the Coakley Landfill is required. The Task Force then completed the work session on the final report by reviewing, editing

and accepting recommendations regarding the Coakley Landfill. Members of the public in attendance were then encouraged to ask questions and voice concerns. Concerns were raised about recent allegations that there was no cancer cluster. Dr. Chan reiterated the position of the NH DHHS that a thorough investigation of reports of RMS and PPB, with support from the CDC, resulted in a determination that this increased incidence of cancer did meet the CDC statistical criteria for a cancer cluster and therefore is a cancer cluster. Dr. Sherman also reinforced that "cancer cluster" is an objective term used by the CDC to describe strictly defined criteria, which, after a careful review of all the available data, was determined by NH DHHS to have been met. He expressed his deep gratitude to all of the Task Force members for their time and dedication as well as the hope that the Commission would move forward, using the final report of the Task Force as a foundation for their continued productive work on this important issue. A vote was then taken on the final report with all members in attendance voting to accept the report with the exceptions of abstentions from Jim Murphy of the EPA, Mike Wimsatt of NHDES and Dr. Ben Chan of NH DHHS.

Recommendations of the Task Force

Seacoast Cancer Cluster Investigation and Department of Health and Human Services

1) Continue annual review of the NH Cancer Registry for new cases of RMS, PPB and pediatric brain cancers in the 5 and 10 town areas.
2) Continue relationship with affected willing families in two-way dialog of information and support.
3) Be willing to reopen questionnaire study if more participants or information warrants.
4) Find new ways to capture relevant data from affected willing families.
5) Support the HB 484 Commission and encourage the Commission's work moving forward.
6) Provide opportunities for the affected families to communicate with the HB 484 Commission.
7) Ensure that the New Hampshire Department of Health and Human Services [DHHS] and New Hampshire Department of Environmental Services [DES] has the resources necessary to address emerging public health concerns.
8) Hire a State Toxicologist immediately.
9) Please see Appendix B of report summary from the DHHS.

Air Quality and Schiller Power Plant

1) Identify sites where ash was historically disposed originating from Schiller.
2) Determine source of coal used and wood ash produced at Schiller in order to identify radioactive content.
3) Assess ash for heavy metals (cadmium), dioxin and radioactive components such as cesium 137.
4) Expand investigation to cover oil and gas power plants in Newington north of Schiller.
5) Study other source of air pollution including landfill off gassing, household heating and truck diesel exhaust, trash and leaf burning and radiation from Seabrook, the Shipyard and biofuel combustion (wood ash).
6) See Appendix C for report and recommendations of the Subcommittee.

Seabrook Station

1) Consider site visit to Seabrook Station.
2) Assess impact of concrete issues such as Alkali-Silica Reaction [ASR] on community health.
3) Acquire and review available information regarding tritium and other contaminants in groundwater wells and Town of Seabrook wells. Recommend additional testing as necessary.
4) Consider subcommittee to review scheduled releases and protocols for ongoing continuous radiation monitoring. Task the Subcommittee to investigate historical, scheduled or routine releases of nuclear radiation, and safety protocols and practice in routine setting and in response to an accident.
5) Review Appendix D for materials from Seabrook Station sent by email from the owners and the Nuclear Regulatory Commission.

Portsmouth Naval Shipyard

1) Consider site visit to Portsmouth Naval Shipyard.
2) Review monitoring data collected by the Navy to see if this also serves to monitor any release from other local sources such as Seabrook Nuclear Power Station and the Schiller plant.
3) Consider subcommittee to review materials and protocols for ongoing monitoring, historical, scheduled or routine releases of nuclear radiation, and safety protocols and practice in routine setting or in response to an accident.
4) Inquire about ongoing monitoring of ships carrying hazardous cargo.
5) Review available data of prior studies of soils, marine water quality, and marine life.
6) Please see correspondence from the Navy and the Shipyard in Appendix E.

Coakley Landfill

1) Since the current selected remedy of Monitored Natural Attenuation (MNA) is ineffective for controlling migration of PFCs into surface water, remediate Coakley Landfill site and mitigate PFC-contaminated discharge to surface waters within the next two years.
2) Monitor private drinking water wells twice a year until a public water supply is provided to the area for homes with private wells where PFCs are equal to or greater than a total of 18 ppt of PFOA and PFOS in the following locations:

    a) Breakfast Hill Road and adjacent developments within a 2-mile radius of the GMZ.
    b) North Hampton within a 2-mile radius of the GMZ.
    c) Test all large groundwater withdrawals (LGWs) within a 1-mile radius of the GMZ for PFCs on at least an annual basis.
    d) Provide residents within 1 mile of the GMZ with drinking water, as soon as possible, as a proactive measure where PFCs exceed a total of 20 ppt for PFOA and PFOS until an alternate water supply or permanent solution is implemented.
    e) Continue to facilitate arrangements between the State MTBE fund, the City of Portsmouth and Town of Greenland to provide a permanent, reliable water supply for approximately 300 homes along Breakfast Hill Road.
    f) Continue to monitor developments relating to PFC contamination of wells operated by public water suppliers to the towns of Hampton, Greenland, North Hampton and Rye.

3) Recommend that NHDES shall require monthly testing of identified public water systems in Greenland, Rye, North Hampton, and Hampton where PFCs have been detected at a level greater than or equal to 18 ppt. NHDES shall also do its own testing once a year of those public water systems with PFCs and other contaminants, as appropriate, that have that have been detected at a level greater than or equal to 18ppt.

4) NHDES and USEPA shall provide the new Commission with responses to the recommendations in this report as soon as possible.

5) EPA and NHDES will provide the Commission with correspondence between regulators and responsible parties as they are received or sent between the agencies and responsible parties including but not limited to:

    a) Data relative to groundwater quality.
    b) Data relative to drinking water quality.
    c) Correspondences between regulators and responsible parties will also be summarized in monthly updates to the Commission and the Community

6) Conduct testing for contaminants known to be related to Coakley Landfill to the full extent of Norton Brook, Bailey's Brook and Little River. Also in Berry's Brook specifically at, but not limited to, four other existing crossings: US Rte. 1, Lang Road, Sagamore Road and at the bridge on Brackett Road.

7) Conduct testing of the fish in Berry's Brook and other waterways that originate near Coakley Landfill for PFCs. Consider if fish advisories should be made and publicly posted and/or fish stocking discontinued. Evaluate fish sample analysis results in light of fish advisories enacted by Michigan.

8) Provide expert, unbiased education and information to the town governments and the public in Hampton, Rye, North Hampton, Portsmouth and Greenland regarding exposures to contaminated drinking water and potential health outcomes. Educate the public on incidences of cancers as reported in the New Hampshire State Cancer Registry.

9) Consider any conflict of interest among:
    a) the governing body and the testing of Rye community water, Grove Road Landfill and Breakfast Hill Landfill monitoring wells;
    b) the board of CLG and its members;
    c) EverSource (formerly Public Service of New Hampshire) currently attempting to purchase Aquarion Water Company which supplies water to Hampton, North Hampton and portions of Rye;
    d) any other conflicts of interest identified;
    e) in the event that a conflict of interest is suspected, recommend a resolution, as appropriate.

10) Continue to seek identification of content in Coakley, Breakfast Hill and Grove Road landfills and any other reported areas of contamination. Consider expanding to other landfills within the cancer cluster area. The chemical composition of the incinerator ash waste placed in Coakley Landfill, Breakfast Hill and Grove Road Landfills is largely unknown. Based on this further investigation, if appropriate, samples of the contents should be collected and analyzed for a full suite of parameters, including but not limited to, semi-volatile organic compounds, dioxins, furans, metals, PFCs and radionuclides.

11) Groundwater, Drinking water and Surface Water Quality Standards:
    a) At least annually, require DES to update current ambient groundwater quality standard for PFCs or other emerging contaminants, if identified, with justification for levels;
    b) Require DES to initiate rulemaking for a maximum contaminant level (MCL) for PFCs in drinking water;
    c) Require DES to review available peer reviewed publications; and,
    d) Require DES to initiate rulemaking for a surface water standard for PFCs.

12) Investigate whether the Groundwater Management Zone (GMZ) should be expanded to the North, South, East and West.

13) Assess temperature gradients along the full length of surface water bodies likely to receive contaminated recharge from overburden and/or bedrock groundwater to determine potential connection of drinking water to contaminant sources. Conduct pore water testing at likely recharge points to assess contaminant sources.

Pease Air Force Base

1) Provide ongoing education to community members and healthcare providers about the possible adverse health effects from PFC exposure, and make available new information as the science related to PFC exposure and health effects advances.

2) Provide guidance for healthcare providers about how to address health concerns and best monitor exposed individuals for potential adverse health consequences.

3) Make healthcare providers and potentially exposed community members aware of the Agency for Toxic Substances and Disease Registry [ATSDR] guidance and the C8 Health Project (c8sciencepanel.org) Medical Monitoring Protocols so concerned individuals can have an informed discussion to decide if they wish to follow such a Medical Monitoring Protocol.

4) Further discussions and communications between DHHS and the medical community (both locally and nationally) to determine the most appropriate medical steps for how to monitor a person's health who has been exposed to PFCs, especially as new science emerges and updating protocols as appropriate.

5) Continue collaboration with existing citizen and government groups investigating and remedying water contamination at Pease.

6) Ensure that all efforts are made to notify those people, including members of the military and their families, who may have been exposed to the contaminated water at Pease and that all those who are eligible are given the opportunity to participate in the health study when it gets underway.

7) Please see Appendix G for a summary by several members of the Pease Community Advisory Board.

Appendix A

Governor's Task Force for Seacoast Cancer Cluster Investigation Invitee and Member List

Commissioner Jeffrey A. Meyers	Department of Health & Human Services	jeffrey.meyers@dhhs.nh.gov
Assistant Commissioner Clark Freise	Department of Environmental Services	clark.freise@des.nh.gov
Gerardo Millan-Ramos	Environmental Protection Agency	millan-ramos.gerardo@epa.gov
James Zuckerman	New Castle Health Officer	james_zuckerman@hms.harvard.edu
Jim Maggiore	North Hampton Chair of Selectmen	jmaggiore@northhampton.nh.gov
Kim McNamara	Portsmouth Health Officer	kimcnamara@cityofportsmouth.com
Martha Wassell	Greenland Health Officer	martha.wassell@wdhospital.com
Mike Wimsatt	Department of Environmental Services	michael.wimsatt@des.nh.gov
Representative Mindi Messmer	District 24	mmessmer@me.com
Former Representative David Borden*		david@davidbordennh.com
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Former Senator Nancy Stiles*		nstiles@comcast.net
Stefany Shaheen		stefanyshaheen@gmail.com
Susan Kindstedt*	Resident of Rye - Mother of two children included in our investigation.	susan.kindstedt@comcast.net

*Member of the Community Advisory Group for the Cancer Cluster Investigation

Appendix B

STATE OF NEW HAMPSHIRE
DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH SERVICES

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603-271-4501 1-800-852-3345 Ext. 4501
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Jeffrey A. Meyers
Commissioner

Lisa M. Morris
Director

Summary of NH Seacoast Pediatric Cancer Cluster Investigation

(Full report accessible at: https://www.dhhs.nh.gov/dphs/hsdm/cancer/rms-investigation.htm)

Background:

In March 2014, residents of Rye, NH, contacted the New Hampshire Department of Health and Human Services (DHHS) to report a possible cluster of rhabdomyosarcoma (RMS) cases among children in Rye. To determine whether the report was consistent with a cluster, DHHS followed Centers for Disease Control and Prevention (CDC) guidance, and used data from the New Hampshire State Cancer Registry to calculate the standardized incidence ratio (SIR) for adult and pediatric cancers (all cancer types) and adult and pediatric rhabdomyosarcoma among residents living in a five-town area including and surrounding Rye, NH.

Adult or pediatric cancers (all types) were not found in greater than expected numbers; however, the specific cancers of pediatric RMS and pediatric pleuropulmonary blastoma (PPB) were. The actual number of identified cases of these cancers, however, were small (< 5 cases for each type over a 10 year time period), which limited the ability to draw conclusions.
More details about the initial February 2016 report can be found here:
http://www.dhhs.nh.gov/dphs/hsdm/cancer/documents/rhabdomyosarcoma2016.pdf.

DHHS reviewed the scientific literature to determine if there were any environmental or lifestyle factors known to be causative for these cancers. The science was limited without significant or consistent evidence for causes other than genetic factors. Following the release of the February 2016 report, a number of community members contacted DHHS indicating potential connections to the seacoast area with children diagnosed with RMS or PPB. DHHS also hosted a community meeting in Rye following the release of the report. Meeting participants identified additional potential environmental exposures in the area that were of concern to the community.

Given public concern over the identified clusters, and feedback from a Community Advisory Group (CAG), DHHS conducted a systematic case investigation to evaluate if there was a potential connection between cases of pediatric RMS and PPB and a common exposure. DHHS distributed a questionnaire to obtain more information from families affected by RMS or PPB in order to describe patient characteristics including environmental exposures; demographics; and clinical, family and social histories in order to identify potential common exposures. It is important to note case series investigations are descriptive and performed primarily to identify patterns and generate hypotheses, because of this limitation, they are not designed or expected to prove cause-and-effect.

Seacoast Cancer Cluster Investigation Questionnaire:

The Seacoast Cancer Cluster Investigation questionnaire was developed by the New Hampshire Department of Health and Human Services (NH DHHS) with input from multiple stakeholders, including the CAG and the Governor's Seacoast Pediatric Cancer Cluster Investigation Task Force in order to gather information on characteristics and potential exposures among those who were diagnosed with rhabdomyosarcoma (RMS) or pleuropulmonary blastoma (PPB). Development of the questionnaire was based on community concerns and the limited scientific literature investigating causes of RMS and PPB; the questionnaire was developed to be broad and inclusive.

Case Finding:

A case definition was created to allow NH DHHS to investigate cases meeting common criteria. A case was defined as a person with laboratory-confirmed RMS or PPB diagnosed since 2001 in a person younger than 20 years old who spent at least 28 days (cumulative, in utero or after birth) in any of the following ten New Hampshire towns (10-town seacoast area): Greenland, Hampton, Hampton Falls, New Castle, Newington, North Hampton, Portsmouth, Rye, Seabrook, or Stratham at least six months prior to diagnosis.

A total of 40 individuals diagnosed with RMS or PPB were notified of the investigation and invited to participate if they self-identified as also meeting the geographic exposure criteria (unlike cancer diagnosis criteria, geographic exposure could not be evaluated through cancer registry data). Twenty-six questionnaires were mailed and hand delivered to individuals identified through the NH Cancer Registry and to former NH residents who reached out to DHHS about participation; 14 letters were mailed to individuals York and Essex counties, identified through the ME and MA cancer registries. A total of 7 questionnaires were returned to NH DHHS with informed consent for individuals meeting the case definition.

Results:

The questionnaire evaluated a variety of factors including geographic exposures including residential air quality and water source and quality; prenatal history and exposures; medical history of cases and their family; and occupational and hobby related exposures for cases and their parents. The following is a summary of results.

Demographic Data and Cancer Diagnosis:

- Individuals diagnosed with RMS/PPB included in this investigation were diagnosed over the course of seven years (between 2004 and 2011); diagnoses did not cluster within any specific year.
- Four cases were female (57%), three were male (43%); the average age of diagnosis was five.

Geographic Exposures:

- Two of the seven respondents reported residence in the 10-town seacoast area prior to diagnosis; the remaining five reported visiting the 10-town area prior to diagnosis. Individuals reported spending time in most of the Seacoast towns. The majority of respondents reported spending time in Portsmouth (n=6), but no specific site in the city was noted. No other town was identified by a majority of respondents. There was no single consistent toxic site reported in close proximity to the majority of respondents.
- There were no common childcare facilities or schools reported. Two of the respondents reported attending a total of four different schools within the 10-town area.
- There were no patterns identified in data related to drinking water source or quality. Two of the seven respondents reported regularly consuming water from a public drinking water supply in the 10-town seacoast area; all others reported either public (n=4) or private (n=2) sources outside of the 10-town area, with one reporting both.
- Three respondents with a residence outside of the 10-town seacoast area reported that home air tests indicated elevated levels of radon. Radon exposure has not been linked to RMS or PPB in scientific studies.

Prenatal History:

- Aside from common use of prenatal vitamins, only two of the seven mothers reported use of any prescription medications during pregnancy. There were no common prescription medications taken and the medications reported are not known to be associated with RMS/PPB.
- There were no exposures reported for illicit drugs or tobacco prenatally.
- There were no reported exposures to x-rays or other medical radiologic scans or nuclear studies during pregnancy.

Individual Case and Family Medical History:

- No common prescription medications or childhood illnesses were identified in the majority of cases. The majority of individuals with RMS/PPB reported no childhood illnesses prior to diagnosis, and of the individuals who reported illness, most involved common childhood ailments such as allergies, asthma, or colds.
- There was no reported tobacco or illicit drug use among cases. One respondent reported case exposure to second-hand tobacco smoke.
- Exposure to medical x-rays was reported for two cases, and one additional case reported probable exposure to dental x-rays. No other radiological scans were reported and no exposure to radiation therapy was reported.
- Four out of seven respondents reported a family history of cancer; none of the cases were among immediate (1st degree) family members.
- There were no common genetic syndromes reported amongst respondents.

Occupational History and Hobbies:

- No parental occupations were reported that suggested chemical exposures to parents.
- No hobbies were reported for parents or cases that suggested chemical exposures.

Summary:

Based on the responses, there do not appear to be any notable patterns to suggest a common exposure or etiology for the development of RMS or PPB among cases, and the findings do not support moving to a case-control study. Additionally, the scientific literature does not point to chemical or environmental exposures as a cause of RMS/PPB, and the majority of cases are thought to either occur sporadically, or to be associated with genetic family cancer syndromes.

Although the findings of the investigation did not point to a common exposure among RMS and PPB cases at this time, DHHS wishes to acknowledge and thank the families and community advisors that gave freely of their time to support the investigation. In particular, the families directly impacted by pediatric cancer should be commended for their generosity and willingness to answer sensitive questions about their medical history, behaviors, and geographic exposures.

Update:

The NH DHHS re-evaluated the number of RMS and PPB cases in the seacoast area in February of 2017 (one-year after the original report), and there have been no new cases of RMS/PPB identified in the 10-town seacoast area. We will continue to review and evaluate RMS and PPB cases reported to the NH State Cancer Registry as new data becomes available, and will reassess the need for ongoing monitoring over time. Any additional questionnaires from families and individuals that meet the case definition are welcomed and will be reviewed.

Even though our investigation has not shown a common identified exposure among RMS and PPB cases, further work is currently being performed in the Seacoast community to address concerns about potential exposure to environmental contaminants out of interest in protecting public health, and NH DHHS will continue to work closely with partners to help address these concerns.

DHHS will continue to provide information to residents about cancer, and through the New Hampshire Comprehensive Cancer Collaboration (www.nhcancerplan.org) help to connect individuals diagnosed with cancer and their families to participate in ongoing cancer research to help improve knowledge about cancer prevention and treatment.

Appendix C

Report of the Air Quality Subcommittee

Concerns for the Cancer Cluster Commission:

1) The clean air act, actually grandfathered thousands of compounds that may be very carcinogenic and/or otherwise dangerous, that have never been evaluated and many may still be present in the environment, and still manufactured and added to numerous things we encounter in our daily lives.

2) It is terribly difficult to relate one chemical/compound to one health outcome, particularly exposures that happen over a period of time. What we also have to be cognizant of, is that it may not be one type of exposure that causes cancer and other ill effects. It may be exposure to too many different chemicals that can interact with each other, or each create its own damage on a cellular or genetic level and those independent effects can be devastating to cells.

3) The nature of science inquiry is such that what we know today will be furthered tomorrow by additional research and epidemiology. Therefore, in looking at acceptable levels of exposure or manufacturing and use of new compounds, the precautionary principle should be applied. "The precautionary principle has four basic tenants: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity (or manufacturers/importers/developers); exploring a wide range of alternatives to possibly harmful actions; (as it relates to new products, processes and development) and increasing public participation in decision making.

4) A voice for local public health should be at the table for any significant environmental development, or changes to existing infrastructure as a matter of public policy.

    a. Compounds are created intentionally in chemical plants or accidentally in the air and can be carcinogenic. New chemicals and compounds are created daily in chemical plants with testing standards required for the industry but not the government.
    b. Neighborhood sources of pollutants are not necessarily picked up by monitors and still can be lethal. An example would be fire training or burning of leaves and trash.
    c. Household sources. Plastics, coatings, cleaning agents all may contain pollutants in the home. It is difficult to monitor these but it is likely that a spick and span home can be more dangerous. House fires apparently are a contributor to a high cancer rate for fire fighters.
    d. Off gas from Coakley. It is likely that methane is the major off gas but more sophisticated testing could be applied.
    e. Radiation from the Seabrook power station and other (historic) sources.

Appendix D

Seabrook Nuclear Power Station

Link to presentation by NH DHHS regarding Seabrook Station:

https://www.dhhs.nh.gov/dphs/gtfscc/documents/gtfscc-portsmouth-06202016.pdf

Links provided by Fred Bower, Chief, Projects Branch 3, Division of Reactor Projects, Region I, U.S. NRC:

Publicly available annual radioactive effluent and environmental reports for Seabrook 1. The reports for the period from 2005 to 2015 are available at the following link on the NRC's website: https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/seab1.html.

The NRC's website provides a significant amount of publicly available information regarding the agency, its mission and our regulatory processes. The following link would be a good starting point to obtain additional information regarding Seabrook Station: https://www.nrc.gov/info-finder/reactors/seab1.html.

Link and summary provided by Alan Griffith, Senior Communications Advisor/ Company Spokesman,
NextEra Energy Seabrook Station:

Link to Radioactive Effluent and Environmental Reports for Seabrook 1:

http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/seab1.html

NextEra Energy Seabrook Station's Radiation Monitoring Program

Background

Seabrook Station has an extremely comprehensive, federally mandated radiation-monitoring program covering both New Hampshire and Massachusetts. The program is operated by well-trained and highly experienced radiological experts at Seabrook Station and radiation monitoring results are independently verified by radiological professionals from both states as well as the Nuclear Regulatory Commission.

On-Site Monitoring

- **Continuous, real-time, at the source** - The most accurate meaningful radiation monitoring is when it is in real-time and at the source.
- **More than 100 on-site monitors** - Real-time monitors examine radiation levels 24 hours a day/7 days a week within Seabrook Station.
- **Independent readings** - The sensors work independently and are capable by themselves of detecting the slightest change in radiation levels anywhere, anytime in the plant.
- **Immediate reporting** - Even the slightest increase in radiation levels at Seabrook would be recognized and reported immediately.
- **Major resource commitment** - More than 30 full-time professional radiological experts work at Seabrook Station, and the annual budget expenditure for all aspects of monitoring is several million dollars per year.

- **Highly trained professionals** - Seabrook has highly trained, experienced professionals responsible for radiation monitoring on site around the clock. These experts live locally with their families, and are personally and professionally committed to protecting public health and safety.
- **No radiological events** - In more than 26 years of operations Seabrook Station has never had a radiological event.

Off-Site Radiological Environmental Monitoring

- **Extensive network of off-site monitors** - There are 110 direct radiation monitors located in 64 different locations from the boundary of the plant to 20 miles away.

- **Off-site monitors provide appropriate backup** - These sensors are checked quarterly to provide verification and backup to the extensive, real-time, at-the-source monitoring that is conducted continuously on site.

- **Additional Environmental monitoring in place** - In addition to the extensive radiation monitoring program, there is comprehensive environmental monitoring up to 10 miles from the plant for:

    - **air** - (8 locations) changed weekly
    - **milk** - (4 locations) changed bimonthly when animals are on fresh feed, and monthly otherwise
    - **fish and invertebrates** - (8 locations) quarterly and biannually
    - **food crops and vegetation** - (4 locations) monthly during growing season
    - **ground water** - (2 locations) biannually
    - **waterborne sampling** - seawater, algae and sediments - (9 locations) monthly and biannually

- **Independent verification** - Radiation safety professionals manage the entire radiation monitoring program; results are independently verified by radiological experts from Massachusetts, New Hampshire, and the Nuclear Regulatory Commission.

Additional Information Regarding Emissions and Radiation

Emissions:
Nuclear energy has an extremely low impact on the environment—including air, land, water, and wildlife—because it does not emit harmful gases, and requires less area to produce the same amount of electricity as other sources. Nuclear power plants help states and regions meet clean air standards by providing a large amount of electricity with **no air emissions**.

Nuclear energy is an emission-free energy source because it does not burn anything to produce electricity. Unlike local power plants such as Newington and Schiller Station in Portsmouth, nuclear power plants produce no gases such as nitrogen oxide or sulfur dioxide that could threaten our atmosphere by causing ground-level ozone formation, smog, and acid rain. Nor does nuclear energy produce carbon dioxide or other greenhouse gases suspected to cause global warming.

Radiation:
Radiation is natural. It's in our food, in the air, water and soil. It's even in our bodies. It comes from unstable atoms—tiny particles of matter. As these atoms break up, they produce invisible energy waves or particles. Our bodies absorb a small amount of this radiation—every hour, every day, every week.

Regarding the amount of radiation that comes from a nuclear power plant, there are many misconceptions. To put it all in perspective, the following information is helpful. Of the total amount of radiation we all constantly receive, about:

- 55% comes from radon in our homes
- 15% from medical and dental X-rays
- 11% from inside our own bodies (food and water we consume)
- 8% from rocks and soil
- 8% from the sun
- 2% from consumer products, including television sets
- 1% from traveling in an aircraft

Living within 50 miles of a nuclear power plant accounts for **less than two ten-thousandths of 1 percent** of our total radiation exposure every year.

Appendix E

Portsmouth Naval Shipyard Correspondence

October 14, 2016

State Representative Thomas Sherman
Governor's Taskforce on The Seacoast Cancer Cluster Investigation
New Hampshire Department of Health and Human Services
129 Pleasant Street
Concord, NH 03301-3852

Dear State Representative Thomas Sherman and the Governor's Taskforce on the Seacoast Cancer Cluster Investigation,

I am writing in response to your telephone call to the Portsmouth Naval Shipyard on September 29, 2016 on behalf of the Governor's Taskforce on the Seacoast Cancer Cluster Investigation. As a matter of introduction, I am the Director of Radiological Controls for the Shipyard and I am responsible for ensuring the proper control of radioactivity and radiation during work performed on nuclear-powered ships. My staff has the responsibility to provide direct oversight of this work to ensure that there is no measurable effect on the Shipyard workforce, the public, or the environment from Shipyard operations. Each of the areas you inquired about in your telephone call is addressed below and in the enclosed documents.

The Portsmouth Naval Shipyard was established on June 12, 1800 during the administration of President John Adams and is the U.S. Navy's oldest continuously operating shipyard. In these 216 years, we have not only played an important role for the Navy, but an important role in our Seacoast Community. We recognize the great support we have received through the years from the Seacoast Community and our families are part of this great community in which we work.

Portsmouth Naval Shipyard was first authorized to accomplish work on nuclear-powered submarines in July 1958. The first nuclear submarine built at Portsmouth was launched in late 1958. Since 1959, we have conducted overhauls and performed maintenance on many different classes of nuclear-powered submarines. We recognize the importance of our maintenance mission. Navy warships are deployed around the world every hour of every day to provide a credible "forward presence," ready to respond on the scene wherever America's interests are threatened. Nuclear propulsion plays an essential role in this protection, providing the mobility, flexibility, and endurance that today's Navy requires to meet a growing number of missions. Today, more than 40 percent of the Navy's major combatants are

nuclear-powered. Enclosure (1) provides overview material regarding the U.S. Naval Nuclear Propulsion Program (NNPP).

Concerning environmental protection and protection of the public surrounding the Shipyard, the NNPP has a comprehensive environmental monitoring program at each of its major installations and facilities, including nuclear-capable shipyards and the homeports of nuclear-powered ships (Enclosure(2) attachment (1)). This monitoring consists of analyzing harbor sediment, water, and marine life samples for radioactivity associated with naval nuclear propulsion plants; radiation monitoring around the perimeter of support facilities; and airborne and liquid effluent monitoring. Environmental samples from each of these harbors are also independently checked at least annually by a Department of Energy laboratory to ensure analytical procedures are correct and standardized. Independent environmental monitoring has also been conducted by the U.S. Environmental Protection Agency in U.S. harbors and the New Hampshire Department of Health and Human Services in the area around Portsmouth Naval Shipyard (Enclosure (2) attachment (3)). The results of these extensive, detailed surveys are consistent with Navy results. These surveys have again confirmed that U.S. naval nuclear-powered ships and support facilities, including Portsmouth Naval Shipyard, have had no discernible effect on the quality of the environment.

It is a long standing policy of the NNPP to reduce exposure to personnel from ionizing radiation associated with naval nuclear propulsion plants to a level as low as reasonably achievable. No civilian or military personnel in the NNPP have ever, in 60 years of operation, exceeded the Federal lifetime limit for occupational radiation exposure. In fact, no civilian or military personnel in the NNPP have exceeded the annual radiation exposure limit of 5 Rem per year (self-imposed by the NNPP 27 years before it was adopted by the Nuclear Regulatory Commission in 1994) since 1968. Further, no civilian or military personnel in the NNPP have exceeded even 40 percent of the annual occupational radiation exposure limit since 1979. The average radiation exposure for an NNPP shipyard worker in 2015, such as those workers at the Portsmouth Naval Shipyard, was 0.017 Rem. This average exposure is equivalent to less than 3 weeks of background radiation exposure, less than 2 routine chest x-ray examinations, less than 0.4 percent of the Federal annual limit for occupational radiation exposure, and 17 percent of the Federal annual radiation exposure limit for members of the general public. Naval nuclear work is engineered to contain

radioactive material at the worksite to protect the worker and the environment (see enclosure (3)).

U.S. nuclear-powered ships are designed to exacting and rigorous standards, built to survive wartime attack, include redundant systems, and are operated by highly-trained crews using rigorously applied procedures. Portsmouth Naval Shipyard has Emergency Response Plans, equipment, qualifications, and training in place that define NNPP responses to a wide range of emergency situations. These plans are regularly exercised to ensure that proficiency is maintained. These exercises involve the participation of the entire Shipyard, utilize the extensive facilities and equipment staged to support emergency response, and verify the ability to collect and analyze radiological surveys and environmental samples. These exercises demonstrate that our Shipyard is well prepared to respond to any emergency. The Shipyard maintains close relationships with civil authorities to ensure that communications and emergency response are coordinated, if ever needed. The Shipyard continually evaluates and improves our emergency preparedness (see enclosure (4)).

I have provided enclosures (1-4) and supporting attachments to expand upon the information provided above. I hope this information satisfies your request. I welcome any additional questions you might have after a review of the enclosed materials. I can be reached directly at telephone extension (207)438-2742 or via email at stephen.fahey@navy.mil.

Sincerely,

S. B. FAHEY
Director, Radiological Controls
Portsmouth Naval Shipyard

Enclosures: 1. The United States Naval Nuclear Propulsion Program, March 2014
2. Radiological Environmental Monitoring
Attachment (1) REPORT NT-16-1, May 2016
(2) Portsmouth Naval Shipyard Radiological Environmental Monitoring Report
(3) EPA-402-R-01-013 of November 2001, Radiological Survey of Portsmouth Naval Shipyard
3. Radiation Safety Programs
Attachment (1) REPORT NT-16-2, May 2016
4. Emergency Preparedness and Response

RADIOLOGICAL ENVIRONMENTAL MONITORING

Beginning in 1957, before radiological work was performed on nuclear-powered submarines, a baseline study of the radiological environment of the Portsmouth Naval Shipyard and surrounding waters was conducted. Radiological environmental monitoring continues through the present.

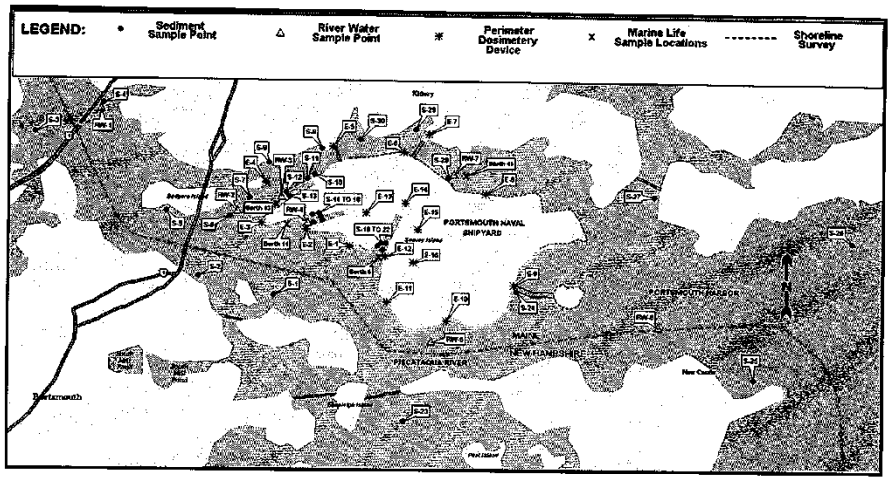
Information on Radiological Environmental monitoring conducted by the U.S. Navy is published annually in attachment (1), entitled *Environmental Monitoring and Disposal of Radioactive Wastes from U.S. Naval Nuclear-Powered Ships and Their Support Facilities*. Since 1966, the information in this attachment has been compiled and provided annually to other Federal Agencies, States, Congress, and the public. This report is also available online at http://nnsa.energy.gov/ourmission/poweringnavy/annualreports.

Attachment (2) is the Portsmouth Naval Shipyard Radiological Environmental Monitoring Report. This annual report provides the results of radiological environmental monitoring performed by Portsmouth Naval Shipyard at the Shipyard. The report compiling Portsmouth Naval Shipyard environmental monitoring information for 2015 was forwarded to the New Hampshire Radiological Health Section on 21 September 2016, consistent with past years.

The radiological environmental monitoring program at the Shipyard includes routine sampling of river/harbor sediment, river/harbor water, marine life, and exhaust stack emissions, as well as shoreline surveys and monitoring perimeter radiation levels. Figure 1 is a map of the Shipyard, the surrounding area and the locations where samples are drawn.

Enclosure (2)

Figure 1.
Portsmouth Naval Shipyard Environmental Monitoring Sample Locations.



Some of the specifics for each sampling modality include:

1. River/Harbor Water Samples. River/harbor water samples are collected during the first month of each calendar quarter. Seven samples are collected at and around the Shipyard. The harbor samples are collected in areas where nuclear-powered ships are berthed and from surrounding areas. Each sample consists of river/harbor water collected from near the surface of the water.

2. River/Harbor Sediment Samples. River/harbor sediment samples are collected during the first month of each calendar quarter. Thirty samples are collected at and around the Shipyard. The harbor samples are collected in areas where nuclear-powered ships are berthed and from surrounding areas. Each sample consists of river/harbor sediment collected using a commercially-available Birge-Ekman dredge modified to sample a thirty-six square inch by approximately one inch deep layer.

3. Marine Life. Marine life samples are collected during July of each year. Samples of marine life include specimens such as mollusks, crustaceans, and marine plants. The marine life

samples are collected in areas where nuclear-powered ships are berthed and from surrounding areas.

4. Exhaust Stack Discharges. Air exhausted from facilities engaged in work that could cause airborne radioactivity is continuously sampled for radiological particulates during the year. For comparison purposes, background air is continuously sampled, away from monitored facilities, with filters which are collected weekly.

5. Shoreline Surveys. During the second and fourth quarter of each year, shoreline areas uncovered at low tide are surveyed with sensitive calibrated instruments for radiation levels to determine if any radioactivity has been washed ashore. Shoreline surveys are conducted on accessible shoreline areas. Survey measurements of background radiation levels are performed approximately 50 feet inland from the high water mark of the shoreline survey areas.

6. Perimeter Radiation Levels. Sensitive thermoluminescent dosimeters (TLDs) are posted throughout each calendar quarter to provide additional assurance that operations at Portsmouth Naval Shipyard do not cause increased radiation exposure to the general public. TLDs are posted at the perimeter locations shown in Figure 1 to measure the accumulated radiation exposure at these locations. For comparison purposes, TLDs are also posted on the same schedule to the north, west, and south of the Shipyard in York, Maine, and Newmarket and North Hampton, New Hampshire, respectively. These TLDs are posted to provide a comparison between perimeter TLD results and naturally occurring background radiation levels in the surrounding areas.

Approximately fifty off-site TLDs are also posted in the seacoast area to support the Shipyard's Radiological Emergency Response Program, which is discussed in enclosure (4) of this letter. These TLD's are read quarterly; results consistently show no measureable increase in background radiation levels due to Shipyard operations.

The results of the radiological environmental monitoring program consistently confirm that radiological controls associated with naval nuclear-powered ships at Portsmouth Naval Shipyard are effective in protecting the shipyard workforce, the environment and the health and safety of the public. Each year, this report has shown that Portsmouth Naval Shipyard operations have not caused an increase in the measurable general background radioactivity of the environment, and that radiation exposure to

the general public is not distinguishable from that resulting from natural background radiation.

For validation of the accuracy of the Shipyard's analysis procedures and equipment, an annual cross-check is performed by an independent U. S. Department of Energy laboratory, Knolls Atomic Power Laboratory (KAPL). The Shipyard quantitatively and qualitatively analyzes an air filter and a simulated sediment/water sample that have been prepared by KAPL. Additionally, twenty-five percent of the sediment samples collected during the first quarter of each year and all routine marine life samples are sent to KAPL for analysis and comparison with Shipyard results. The Shipyard consistently demonstrates an acceptable level of proficiency for the analysis of environmental samples.

The U.S. Environmental Protection Agency National Air and Radiation Environmental Laboratory published three exceptionally detailed radiological survey reports over the history of the Shipyard. The reports are entitled *Radiological Survey of Portsmouth Naval Shipyard*, and are available at https://nepis.epa.gov. They present the results of radiological surveys conducted in July 1977, September 1989, and September 1997. Attachment (3) contains the EPA report issued in 2001 documenting results of the 1997 radiological surveys. The purpose of the surveys was to assess whether the nuclear work at the Shipyard has created elevated levels of environmental radioactivity in and around the Shipyard that could expose nearby populations or contaminate the environment.

During the EPA surveys, samples were collected and radiation levels were measured. During the 1997 survey specifically, 135 samples were collected from 72 sampling locations. Samples included drinking water, harbor water, sediment, sediment cores, and biota (marine life). Radiation level measurements were performed at 48 different sites. The 1997 survey detected no radioactivity associated with the NNPP. All three surveys have concluded that the Shipyard's nuclear work have resulted in no increase in radioactivity that would result in significant population exposure or contamination of the environment.

The New Hampshire Department of Health and Human Services (DHHS), through its Division of Public Health Services (DPHS) has a well-established, continual environmental monitoring program for the three nuclear facilities: Seabrook Nuclear Power Station; Vermont Yankee Nuclear Power Station; and Portsmouth Naval Shipyard.

At DPHS, the Radiochemistry Laboratory routinely performs radioanalysis of environmental samples of air, water, soil, sand, sediment, vegetation, milk, fish, lobster, mussels, atmospheric particulate material, and direct gamma radiation levels obtained from various sites within the State. During 2010, DHHS personnel collected a total of 1,325 samples from locations around the three nuclear facilities, as well as samples from various control locations throughout New Hampshire. An estimated 10,000 individual measurements were performed on these samples.

DHHS's radio-analytical data indicate no radioactivity greater than the normal and expected background. Analysis of posted TLDs showed no radiation exposure levels above normal background levels over a 10-year period. The latest report available on the internet regarding this monitoring is dated 2010 and is located at http://www.dhhs.nh.gov/dphs/lab/documents/rem2010.pdf.

RADIATION SAFETY PROGRAMS

Attachment (1), entitled *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and their Support Facilities*, contains a report of radiation exposure received by shipyard workers and sailors serving aboard nuclear-powered ships. Since 1966, the information in this report has been compiled and provided annually to other Federal Agencies, States, Congress, and the public. This report is also available online at http://nnsa.energy.gov/ourmission/poweringnavy/annualreports.

Naval reactor plant shielding is conservatively designed to minimize radiation exposure to personnel. Personnel operating the Navy's nuclear-powered ships receive much less radiation exposure in a year than the average U.S. citizen does from natural background and medical radiation exposure. For example, the occupational exposure received by the average nuclear-trained sailor living onboard one of the Navy's nuclear-powered ships in 2015 was less than a twentieth of the radiation received by the average U.S. citizen from natural background sources that year.

Naval bases and shipyards minimize the number of places where radioactive material is allowed. Stringent controls are in place during the movement of all radioactive material outside these nuclear support facilities. A radioactive material accountability system is used to ensure that no radioactive material is lost or misplaced in a location where personnel could unknowingly be exposed. Regular inventories are required for every item in the radioactive material accountability system All personnel assigned to a shipyard are trained to recognize radioactive material and to take immediate action if radioactive material is discovered out of place. Shipyards are required to minimize the generation of radioactive material and to promptly dispose of radioactive material in accordance with applicable regulations.

Access to radiation areas is controlled by signs and barriers. Personnel are trained in the access requirements, including the requirement to wear dosimetric devices to enter these areas. Dosimetric devices are also posted near the boundaries of these areas to verify that personnel outside these areas do not require monitoring. Specifically, the dosimetric devices posted on the boundaries of radiological areas validate that unmonitored shipyard personnel do not receive more than 0.100 Rem per year of radiation exposure from NNPP work, the same amount of exposure allowed for members of the general public by

the Nuclear Regulatory Commission. Frequent radiation surveys to validate the boundaries of radiological areas are required using sensitive instruments that are checked before use and calibrated regularly.

Perhaps the most restrictive regulations in the NNPP's radiological controls program are those for controlling radioactive contamination. Work operations involving the potential for spreading radioactive contamination use containments to prevent personnel contamination or the generation of airborne radioactivity. The controls for radioactive contamination are so strict that precautions sometimes had to be taken in the past to prevent tracking contamination from the world's atmospheric fallout and natural sources outside radiological areas *into* radiological spaces because the contamination control limits used in the nuclear areas were below the levels of fallout and natural radioactivity occurring outside in the general public areas. The NNPP's basic approach is to contain radioactivity at the source. In addition to providing better control over the spread of radioactivity, this method has reduced radiation exposure. A basic requirement of contamination control is to monitor all personnel leaving any area where radioactive contamination could possibly occur. Workers are trained to survey themselves (e.g., frisk), and their performance is checked by the radiological controls personnel. Frisking of the entire body is required, normally using sensitive field survey instruments. Trained radiological controls personnel frequently survey for radioactive contamination with sensitive calibrated field instruments. These surveys are reviewed by supervisory personnel to verify that no abnormal conditions exist.

The NNPP's policy is to prevent significant radiation exposure to personnel from internal radioactivity. Airborne radioactivity is controlled to one-tenth of the levels allowed by U.S. Environmental Protection Agency guidance. Radiation workers are also periodically monitored with sensitive laboratory equipment to ensure they have not ingested or inhaled NNPP radioactivity. As a result, no shipyard workers have received measurable internal contamination from NNPP work in over 20 years.

Since the beginning of the NNPP, personnel radiation exposure has been monitored using dosimetric devices worn on an individual's body. Dosimetric devices are worn on the trunk of the body, normally at the waist or chest. In some special situations, additional dosimeters are worn at other locations,

for example on the hands, fingers, or head. Portsmouth Naval Shipyard is accredited under the National Voluntary Laboratory Accreditation Program (Laboratory Code 100565-11) for processing ionizing radiation dosimetry. Portsmouth Naval Shipyard is regularly tested by outside organizations to ensure consistency with accepted standards.

Compliance with radiological controls requirements is checked frequently by radiological controls personnel, as well as by other personnel not affiliated with the radiological controls organization. An independent radiological audit group reviews compliance with all radiological controls requirements and the audit group's findings are regularly reported directly to senior shipyard management, including the Shipyard Commander. The U.S. Department of Energy also has a representative at the Shipyard who reports to the Director, Naval Nuclear Propulsion. At least one assistant to the Department of Energy representative is assigned full-time to audit and review radiological controls. NNPP Headquarters personnel also conduct periodic inspections of radiological controls in the Shipyard.

Attachment (1) also discusses the results of studies on the health effects of low-level radiation exposure on people, including workers at Portsmouth Naval Shipyard, beginning on page 40. The biological effects of ionizing radiation exposure have been studied for over a century, long before the advent of nuclear power. The large number of high quality studies on the effects of radiation exposure on human beings led the National Academy of Sciences to conclude that there is more evidence about the effects of ionizing radiation exposure than most, if not all, other environmental agents that could affect the general public. A few of the studies are discussed below. As discussed in these studies, the consistent conclusion is that the risk of health effects from ionizing radiation exposure is very low and small compared to other commonly accepted risks at work and in everyday life.

The National Academy of Sciences - National Research Council, in 2006, published a report titled, "Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII-Phase 2". It was a report compiled by a committee of scientific experts responsible for assessing health risks from exposure to low levels of ionizing radiation. The BEIR committee concluded that studies of populations chronically exposed to low-level radiation have not shown consistent or conclusive evidence upon which to determine the risk of cancer induction from low-level radiation exposure, if any exists.

Despite the lack of consistent or conclusive evidence from such low-dose studies to date, there are low-dose groups that have been, and are currently being, studied. Such groups include persons exposed as a result of medical procedures; exposed to fallout from nuclear weapons testing; living near U.S. commercial nuclear installations; living in areas of high natural background radiation; and occupational exposure to low doses of radiation. The overall conclusion reached by the National Academy of Sciences from reviewing these studies was:

> Studies of populations chronically exposed to low-level radiation. . . have not shown consistent or conclusive evidence of an associated increase in the risk of cancer (BEIR V, 1990).

The National Cancer Institute also completed a study of cancer in 1990 for U.S. populations living near 62 nuclear facilities that had been in operation prior to 1982. This study included commercial nuclear power plants and Department of Energy facilities that handle radioactive materials. The National Cancer Institute study concluded that there was no evidence that leukemia or any other form of cancer was generally higher in the counties near the nuclear facilities than in the counties remote from nuclear facilities (National Cancer Institute, "Cancer In Population Living Near Nuclear Facilities," NIH Publication No. 90-874, July 1990).

In 1978, Congress directed the National Institute for Occupational Safety and Health (NIOSH) to perform a study of Portsmouth Naval Shipyard workers who were occupationally exposed to low-level radiation. Congress also chartered an independent oversight committee of nine national experts to oversee the performance of the NIOSH study in order to ensure technical adequacy and independence of the results. In December 1980, the NIOSH researchers completed the first report on a detailed study of the mortality among employees of the shipyard. The report concluded that "Excesses of deaths due to malignant neoplasms and specifically due to neoplasms of the blood and blood-forming tissue, were not evident in civilian workers at Portsmouth Naval Shipyard. . . ." A second study was also conducted, to compare the work and radiation histories of persons who died of leukemia, with persons who did not. In this analysis, again, no relationship was found between leukemia and radiation. NIOSH published the results of an update to the 1980 study in the July 2004 edition of the Journal of Occupational

and Environmental Medicine (S.R. Silver, et. al, "Differences in Mortality by Radiation Monitoring Status in an Expanded Cohort of Portsmouth Naval Shipyard Workers" Journal of Occupational and Environmental Medicine 2004; 677-690). The NIOSH study found nothing to conclude that the health of shipyard workers has been adversely affected by low levels of occupational radiation exposure incidental to work on nuclear-powered ships. The study showed no statistically significant cancer risks linked to radiation exposure, when compared to the general U.S. population. Further, the overall death rate among Portsmouth Naval Shipyard occupational radiation workers was less than the death rate for the general U.S. population.

In 1991, researchers from Johns Hopkins University, Baltimore, Maryland, completed a comprehensive epidemiological study of the health of workers at the six naval shipyards (including Portsmouth Naval Shipyard, discussed above) and two private shipyards that serviced U.S. naval nuclear-powered ships (G. M. Matanoski, et. al, "Health Effects of Low-Level Radiation in Shipyard Workers," Johns Hopkins University Department of Epidemiology School of Hygiene and Public Health, June 1991). This independent study did not show any cancer risks linked to radiation exposure. Additionally, it found no evidence to conclude that the health of people involved in work on U.S. naval nuclear-powered ships has been adversely affected by exposure to low levels of radiation incidental to this work.

The policies discussed above, according to the standard methods for estimating risk, reduce the cancer risk to the group of personnel occupationally exposed to radiation associated with naval nuclear propulsion plants to less than the risk these same personnel have from exposure to natural background radiation.

EMERGENCY PREPAREDNESS AND RESPONSE

The likelihood of an accident resulting in radioactivity from the nuclear reactor core itself being released from the ship to the environment is extremely small. However, the U.S. Navy never dismisses such an accident scenario as something that does not deserve serious consideration. The U.S. Navy has made thorough studies on: what could bring about a release of radioactivity from the ship during highly unlikely accident scenarios, what effect such a release could have on the environment, and what emergency plans would be required for such a situation.

All U.S. nuclear-powered warships (NPWs) use pressurized water reactors (PWRs). PWRs have an established safety history, their operational behavior and risks are understood, and they are the basic design used for approximately 60% of the commercial nuclear power plants in the world. The mission that naval reactors support is different from the mission of commercial reactors. All U.S. NPWs are designed to survive wartime attack and to continue to fight while protecting their crew against hazards. They have well-developed damage control capabilities, redundancy, and backup in essential systems. In addition, to support the mission of a warship, naval reactors are designed and operated in such a way as to provide rapid power level changes for propulsion needs, ensure continuity of propulsion, and have long operational lifetimes. These are the significant differences between U.S. NPW and commercial reactor missions. Also, the fact that operators and crews have to live in close proximity to the nuclear reactor requires that the reactor have redundant systems and comprehensive shielding and be reliable and safe. For these reasons, naval reactor plant designs are different from commercial reactors, which results in enhanced capability of naval vessels to operate safely under harsh battle conditions, or even more safely during peacetime operations.

There are at least four barriers that work to keep radioactivity inside the ship, even in the highly unlikely event of a problem involving the reactor. These barriers are the fuel itself, the all-welded reactor primary system including the reactor pressure vessel containing the fuel, the reactor compartment, and the ship's hull. Although commercial reactors have similar barriers, barriers in U.S. NPWs are far more robust, resilient and conservatively designed than those in civilian reactors due to the fundamental differences in mission.

Operation of naval reactors is also different from that of commercial reactors because of the different purposes they serve. First, U.S. naval reactors are smaller and lower in power rating than typical civilian reactors. The largest U.S. naval reactors are rated at less than one-fifth of a large commercial reactor plant. Also, U.S. naval reactors do not normally operate at full power.

Second, the naval reactor power level is primarily set by propulsion needs, and not by the ship's other service needs, which are also powered by the reactor but require a small fraction of the power required for propulsion. Consequently, reactors are normally shut down shortly after mooring and they are normally only started up shortly before departure, since only very low power is required for propulsion in port. While in port, electric power for service needs is provided from shore service supplies.

From these two facts alone, it follows that the amount of radioactivity potentially available for release from a reactor core of a U.S. NPW moored in port is less than about one percent of that for a typical commercial reactor.

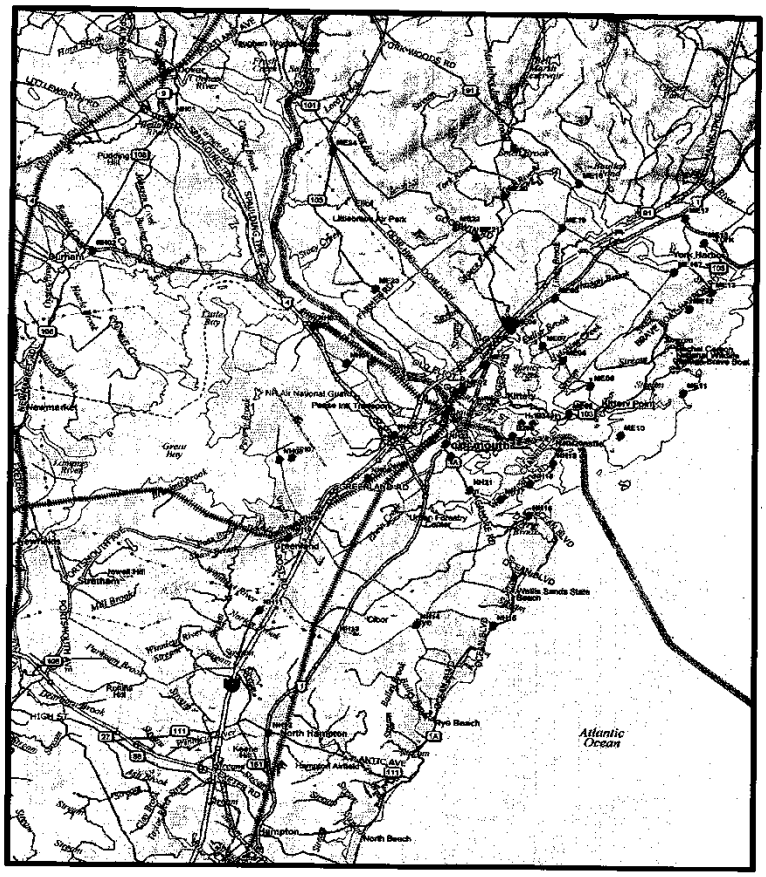
Planning for emergencies is based on extensive technical analysis, as well as recommendations and guidance provided by numerous agencies experienced in emergency planning, including the Department of Homeland Security, the Navy, the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency, the National Council on Radiation Protection and Measurements, and the International Atomic Energy Agency.

Each Naval Nuclear Propulsion Program (NNPP) site, including Portsmouth Naval Shipyard, maintains equipment, facilities, response plans, responder qualifications and continuing training programs to support response to a range of emergencies. Included in this emergency response capability is the ability to collect and analyze radiological surveys and environmental samples both on and off the Shipyard to confirm that the emergency has not had a discernable impact on the sailors, workforce, public, or the environment.

The Shipyard maintains approximately 50 off-site emergency thermoluminescent dosimeters (TLDs) in New Hampshire and Maine. These TLDs are posted at various locations around the Shipyard (see Figure 2) and are read quarterly. Results from processing these off-site TLDs consistently show no measurable increase in background radiation levels due to Shipyard operations. In the

highly unlikely event of a radiological emergency at the Shipyard, these TLDs would be used to verify the emergency does not pose a risk to the public or the environment.

Figure 2.
Portsmouth Naval Shipyard Emergency TLD Locations.



As a whole, the NNPP has approximately 800 Radiological Controls Technicians and 5000 Contamination Workers throughout the U.S. trained in emergency response that could be called upon if needed.

This response is in addition to other federal resources our program could call upon as part of being assigned as the Coordinating Agency for the Federal response in the highly unlikely event of a NNPP radiological emergency per the National Response Framework.

One crucial component of our emergency preparedness is our civil authority outreach programs. If a radiological emergency were to ever occur on a NPW, state and local civil authorities in New Hampshire and Maine would be promptly notified and kept informed of the situation. With the support of the NNPP and Shipyard personnel, civil authorities would determine appropriate public actions, if any, and transmit this information via their normal emergency communications methods.

Portsmouth Naval Shipyard maintains close relationships with civil authorities to ensure that communications and emergency responses are coordinated, if ever needed. Periodic exercises are conducted with State and local officials, demonstrating the Navy's commitment to work as a team in response to emergency situations. The emergency response coordination and cooperative communication we experienced during the fire on-board ex-MIAMI is a testament to this solidly established, effective outreach, even though the fire did not result in any concerns for the reactor.

As discussed above, the largest naval reactors are rated at less than one-fifth of a large U.S. commercial nuclear power plant. In addition, since reactor power is directly linked to propulsion requirements, naval nuclear propulsion plants typically operate at low power when the ship is close to shore where high speeds are not required and are normally shut down when in port. Less than about 1 percent of the radioactivity contained in a typical commercial nuclear power plant could be released from a naval nuclear propulsion plant, limiting the possible dose to the general public and the size of the area of potential concern. Therefore, the Navy considers that existing civil authority plans for responding to natural and industrial disasters are sufficient to deal with any highly unlikely event on a U.S. NPW. It is important to note that there are no U.S. NPW specific civil authority plans for public protective actions, such as sheltering, evacuation, or distribution of potassium iodide, in any U.S. port where NPWs are homeported or maintained since it is not required for public safety.

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

4 August 2017

Dr. James Zuckerman, M.D.
Health Officer and Chairman
Town of New Castle, NH
Town Hall
PO Box 367, 49 Main Street
New Castle, NH 03854

Dear Dr. Zuckerman:

My name is Troy Mueller and I am the Director of Nuclear Technology for the Naval Nuclear Propulsion Program. I regulate radiological safety and radiological environmental monitoring of shipyard work on U.S. nuclear-powered warships, including at Portsmouth Naval Shipyard (PNSY). I have worked in this business for over 30 years and have always strived to lead a program that supports our National Defense prorities while ensuring the highest standards of radiological safety.

I recently learned of your praise of PNSY's work to control and monitor the low-level radioactivity associated with work on nuclear-powered warships during the June 27th, 2017 meeting of the New Hampshire Governor's Task Force. Rarely in my over 30 years in this business have I seen someone state so clearly why I do what I do. I believe your words captured the essence of the Naval Nuclear Propulsion Program's core values.

Specifically, I believe one of the Program's core values is to take care of our "Four Customers" – the Sailors, the Workers, the Public, and the Environment. When I make a decision, I consider how each of those "Four Customers" would critique my decision, particularly the Public that lives directly outside our fencelines. I was touched by your words about how PNSY upholds those values and protects the "Four Customers".

I understand you are looking forward to receiving the 2017 version of the Program's annual reports on radiological environmental monitoring, disposal of radioactive wastes, and exposures of Navy and civilian workers to radiation associated with U.S. naval nuclear propulsion plants. Enclosed with this letter are copies of the 2017 versions of the reports, with my compliments. Thank you for your kind words during the Task Force meeting. Your unbiased assessment validates the efforts of the thousands of people that work to protect the Nation, the public, and the environment. Stephen Fahey, Director of Radiological Controls at PNSY, remains the primary point-of-contact for any questions about the shipyard (207-438-2472, stephen.fahey@navy.mil). However, please feel free to contact me by phone at (202) 781-6144 or by email at troy.j.mueller@navy.mil if you have any questions.

Sincerely,

T. J. MUELLER
Director, Nuclear Technology Division
Naval Nuclear Propulsion Program

Enclosures (2)

Appendix F

Final Report of the Coakley Landfill Subcommittee

9/24/2017

Photograph 1 Photo of sign posted at Breakfast Hill Road and PanAm Railbed requested by area legislators and installed by Coakley Landfill Group. Signs were posted to warn residents of potential risk associated with contacting contaminated surface water caused by Coakley Landfill.

Final Report of the Coakley Land Fill Sub Committee

Membership:

On September 14, 2016 Chairman Rep. Tom Sherman, MD of the Governor's Task Force to Investigate the Seacoast Pediatric Cancer Cluster, appointed Task Force member, Mindi Messmer, a Rye resident and Environmental Scientist to chair a subcommittee to focus on Coakley Landfill. Senator Nancy Stiles, Michael Wimsatt, Director of the Waste Management Division of the New Hampshire Department of Environmental Services, and Representative David Borden (Rye and New Castle) were appointed to the Subcommittee.

Charge of the Subcommittee:

The goal of the subcommittee is to review the evidence of any potential imminent threats posed by Coakley Landfill to the environment and to recommend specific steps required to address those threats. The Subcommittee was charged with submitting an Interim Report (Appendix A) in December 2016. A final subcommittee report to the task force is also to be submitted to the Governor.

Public Meetings Held:

The Subcommittee held a total of 9 public meetings. These were held on October 13th, 20th, 26th, and 31st of 2016 and September 20, 2017 in the Rye Junior High School. Also on January 17, March 3, June 25 and Aug. 23rd at Rye Public Library.

Additional Activities of the Sub-Committee:

- On October 20th subcommittee members joined a site visit to the Coakley Landfill along the abandoned railroad track bisecting the Ground Management Zone (GMZ) hosted by Coakley Landfill Group (CLG). Members walked the abandoned rail to view the Coakley site and identified the testing wells and observed the large ponds of ground water.
- Committee members conducted a comprehensive review of the history and documentation of the landfill.
- Members met with landowners on the west side of Coakley Landfill that lived near the site during the periods of disposals and capping.
- Members convinced regulators of need to look for additional private wells in Rye and North Hampton (Postcard Survey). Postcards were sent to addresses identified by comparing water service billing records. Several private wells were identified during this process which was sampled for PFCs.
- Members approached landowners on the south to gain access to private wells but efforts were unsuccessful.
- Local officials were successful in compelling CLG to post warning signs adjacent to Berry's Brook in Greenland to warn residents about chemicals in the brook.
- Legislators were successful in convincing regulators to compel CLG to test fish in Berry's Brook for potential PFCs.

Presentations:

Meeting slide decks presented at Subcommittee meetings are provided in Appendix B which include presentations by:

1. New Hampshire Department of Environmental Services (NHDES)
2. United States Environmental Protection Agency (USEPA),
3. United States Geological Service USGS
4. Rye Water District (see Appendix D)
5. Subcommittee chair

Findings:

Based on historical information, the Coakley Landfill property was mined for sand and gravel and was a rock quarry as early as 1969. Up to 20 feet of material had been excavated from the site by 1971.

In March 1971, the town of North Hampton requested approval to use the Coakley property as a landfill. In April 1971, a permit was granted to the town of North Hampton to operate a landfill. The Coakley Landfill was permitted for operation beginning in 1971 through 1987 (see Good Faith Offer, Appendix D). In the early 1970s, the state did not employ much technical review staff for review of licensing of landfills such as Coakley Landfill and did not have any regulations for citing of landfills. The City of Portsmouth, the towns of Newington, New Castle, North Hampton and Pease Air Force Base entered into an agreement to use the Coakley land for landfill operations. According to historical records, the landfill application was reviewed by state and federal agencies. Given the time period that the landfill was operational industrial and commercial waste and the fact that hazardous waste separation was not practiced during that time, it is likely that the waste disposed had significant quantities of hazardous waste (Good Faith Offer, 1991).

Landfill operations began in 1972, with the southern portion of the Site used for refuse from the municipalities of Portsmouth, North Hampton, Newington, and New Castle, along with Pease Air Force Base. In January 1972, an agreement was made between North Hampton, Portsmouth and Coakley Landfill outlining responsibilities for operation of the landfill. Other users included the towns of New Castle, Newington and Pease Air Force Base (Pease). The agreement with Pease prohibited the dumping of shop and ordnance waste from Pease Air Force Base, located in Newington, NH, as well as demolished buildings, junk autos, machinery, and large tree stumps or butts. Coincident with landfill operations, rock quarrying was conducted at the Site from approximately 1973 through 1977. Much of the refuse disposed of at Coakley Landfill was placed in open (some liquid-filled) trenches created by rock quarrying sand and gravel mining. State inspections were conducted during the operation of the landfill.

According to reports from residents who lived in Lafayette Terrace, prior to 1975 barrels and tanker trucks dumping liquid wastes were observed at Coakley Landfill (Appendix D, Management of Migration RI/FS, CDM 1994).
In 1978 and 1979 oil-soaked debris from accidents in Portsmouth and Newington, was placed in what is known as the Oily Debris Area in the northern section of the Coakley Site (Figure 2 in Appendix C). The precise volume of this material is unknown.

In 1981, the State of New Hampshire granted the Town of North Hampton permission to dispose of pesticide waste containers at the Coakley Landfill Site.

The City of Portsmouth began operating a refuse-to-energy plant on leased property at Pease Air Force Base in 1982. From July 1982 through July 1985, Pease Air Force Base and the municipalities of Rye, North Hampton, Portsmouth, New Castle, and Derry began transporting their refuse to this plant for incineration. After that time, the Coakley Landfill generally accepted only incinerator residue from the new plant. The NHDES approved the disposal of ash from the Waste to Energy Program in Coakley Landfill. In March 1983, the Bureau of Solid Waste Management ordered an end to the disposal of unburned residue at the Coakley Landfill. The Coakley dump was closed in July 1985 due to volatile organic compound (VOC) contamination of residential drinking water wells in Lafayette Terrace area. In 1986, municipal water lines were installed to provide water to Lafayette Terrace.

In August 1982, correspondence indicates that ash from the Waste to Energy Program at Pease was approved for disposal at the Breakfast Hill Landfill operated by the town of Rye at the corner of Breakfast Hill Road and Lafayette Road (Appendix D). It is possible that ash was disposed at the Breakfast Hill Landfill for several years although the exact length of time of disposal was not noted.

Prior to incineration, the New Hampshire Waste Management Division estimated that approximately 120 tons per day were disposed of at the landfill. The daily weight of incinerator residue was estimated to be approximately 90 tons. Analytical results for ash obtained during file reviews are provided in Appendix D. In the end, it is estimated that an approximate 50-foot-thick layer of ash was accumulated in the landfill. Additional information is presented in Appendix A.

Regulatory Findings Summary:

The Record of Decision (ROD) for OU1 issued in 1990 specified remedial plans which included a cap and extraction and treatment of groundwater. Correspondence dated April 2, 1987 from Michael J. Robinette of DES entitled "Coakley Landfill – Remedial Investigation Status Report/Preliminary Screening of Technologies, Jan. 27, 1987" commented that "A liner for the dump is not addressed." As of February [136 N.H. 407] 1990, the EPA's proposed "Remedial Action" or "Preferred Alternative," included "placing a cap over the landfill to minimize the migration of contaminants from the landfill; and "collection and treatment of groundwater to remove and prevent further migration of contaminants " This containment and cleanup plan, bearing an estimated cost of $20,200,000, represents a compromise between less expensive, less environmentally protective plans and more costly, more protective ones." Clearly, installing controls on migration of groundwater was originally planned.

When the ROD for OU2 was issued in 1994 (https://semspub.epa.gov/work/01/14810.pdf), the remedial approach for Coakley included a cap and monitored natural attenuation (no active groundwater control). The remedy included institutional controls (ICs) [controls on groundwater use], natural attenuation and groundwater monitoring. The active groundwater pump and treat portion of the 1990 ROD was not implemented. "The key element of this alternative is based on the ability of the groundwater contamination to naturally attenuate, which the EPA is projecting to take roughly 11 years. This compares to the estimated five to 10 years it would take to actively pump and treat the groundwater until cleanup levels are met." (USEPA, 1994). In 1999, the USEPA approved the removal of groundwater extraction and treatment from the remedial objectives (USEPA ESD, 1999).

In 1992, USEPA and NHDES filed an action under CERCLA (Superfund) against a group of businesses and municipalities that were allegedly responsible for the contamination (later Coakley Landfill Group [CLG]). In March 1992, CLG signed a Consent Decree with NHDES and USEPA requiring CLG to implement the remedial action for the site that shifted the "lead" from USEPA to CLG for the implementation. USEPA and NHDES have input into the process but CLG leads. The CLG is comprised of City of Portsmouth, North Hampton, the US Air Force, US Navy and many businesses. Three Consent Decrees were located during file reviews along with a participation agreement for entities that became the CLG. The participation agreement lists the relative proportion of responsibility of each of the participants. A copy is provided in Appendix B. Of note, Public Service of New Hampshire is listed as a responsible party. EverSource (previously Public Service of New Hampshire) is currently attempting to purchase Aquarion Water Company, the public water supplier of water for the town of Hampton, North Hampton and portions of Rye, which may represent a conflict of interest.

A proposed Consent Decree in *United States* v. *City of Portsmouth, et al.* and *State of New Hampshire* v. *City of Portsmouth, et al.,* consolidated as Civil Action No. 98– 600–SD, was lodged with the United States District Court for the District of New Hampshire on October 30, 1998 and is listed in Vol.63 No. 223 of the Federal Register dated November 19, 1998.

In 2016, the State of NH was informed that the small number of cases of a rare pediatric cancer met the Centers for Disease Control (CDC)-defined pediatric cancer cluster in the 5-town area. Area residents became concerned that there was an environmental trigger responsible for the cancers. In 2017, the New Hampshire Department of Health and Human Services (DHHS) indicated that the incidence of pediatric brain cancers in the same 5-town area had risen to more than 2 times the expected rate.

When the Task Force began looking at Coakley Landfill, Chairman Tom Sherman requested that monitoring wells be sampled for perfluorinated chemical (PFCs) since Pease Air Force Base is a primary PRP and PFCs were an emerging contaminant responsible for shutting down the Haven Well in Portsmouth.
In September 2016, CLG, USEPA and NHDES agreed with members of the Governor's Task Force that groundwater may flow from Coakley Landfill to the northeast, east and southeast. It was also brought to their attention that historically there had been many drinking water wells recorded in these areas and that residents were still drinking water from private wells. NHDES and EPA agreed to send postcards to residents to identify private well use in this area. Approximately 79 drinking water wells have been reported to date.

However, the NHDES and EPA have agreed to conduct a more extensive survey for the potential for additional wells in this area. If found, EPA and NHDES have stated that they will test a subset of additional wells identified.
On September 26, 2016 USEPA issued the Fourth Five-Year Report for Coakley
(https://www3.epa.gov/region1/superfund/sites/coakley/448390.pdf.

Hydrogeology Findings:

The Subcommittee also learned that the bedrock beneath the Coakley Landfill and adjacent areas is very porous and permits groundwater flow and thereby contamination migration readily. Additional information is presented in Appendix A.

Drinking Water Protection:

In addition to compounds detected historically, two types of compounds that are resistant to breaking down naturally in groundwater have been detected in monitoring wells located on the Coakley Landfill and wells located on adjacent properties northwest of Coakley Landfill. These compounds include 1,4-dioxane and PFCs.

The DES criteria for 1,4-dioxane is 3 ug/L which is an order of magnitude higher than the criteria Massachusetts has implemented for the same compound. Therefore, the Subcommittee questions whether or not these criteria are protective enough. Concentrations in private drinking water outside of the GMZ exceed Massachusetts' criteria.

Levels of PFCs were detected above EPA criteria of 70 parts per trillion (ppt) in more than 16 wells located within the GMZ (Figure 13) and concentrations increased year over year between 2016 and 2017, some substantially.

The criteria for PFCs in drinking water have been adjusted downward recently in many states and for EPA. These reductions in acceptable limits are the results of new studies of the health effects of PFCs. EPA has proposed a 70 ppt threshold which DES has proposed to adopt. However, states like New Jersey, Vermont and state representatives in Pennsylvania have proposed much lower standards including 14 ppt, 20 ppt and non-detect, respectively. The lower standards are based on the inclusion of toxicology studies that indicate damage to mammary development and prenatal development while the EPA has rejected use of this data to conclude a higher standard at 70 ppt. Therefore, the Subcommittee questions whether or not the 70 ppt criteria are protective enough for drinking water in New Hampshire. PFC concentrations in private drinking water outside of the GMZ exceed Vermont and proposed NJDEP and PA criteria.

The 2016 EPA Five Year Review (https://semspub.epa.gov/work/01/591521.pdf) concludes that proposed new development in Greenland along Breakfast Hill Road should not be allowed to install private drinking water wells due to the "strong potential for these wells to cause groundwater contaminant migration from the Site to the proposed residential development." Since that time, the developer and the City of Portsmouth have established an agreement to provide water from the Town of Rye to the new development.

At several Subcommittee meetings, several residents of Stone Meadow and Falls Way developments in Greenland discussed their opinions about the need to provide drinking water to residents. Written comments were also

submitted and copies are provided in Appendix D. EPA has stated in a Subcommittee meeting that while they agree that residents in Stone Meadow should receive supplied water, they have no ability to enforce the PRPs to do so.

Members of the Task Force reported concerns relating to the potential for migration toward municipal water systems in the towns of Rye, North Hampton, Portsmouth and Hampton.

The Town of Rye drinking water supply wells are located off Garland Road. PFCs were detected in two drinking water supply wells in the Town of Rye in samples collected in April 2016 and at increased concentrations year over year in 2017. A total of 6 parts per trillion (ppt) was detected in the Cedar Run well and 21 ppt in the Garland well in 2017. Samples collected from monitoring wells located adjacent to the Grove Road Landfill located less than 1000 feet from the Garland well total up to 151 ppt. The PFCs in these wells is likely related to the Grove Road Landfill or migration from Coakley Landfill through bedrock fractures or a combination.

As part of an intervention filed for the EverSource purchase of Aquarion Water, subcommittee members learned that PFCs concentrations in one supply well increased from 20 ppt (June 2016) to 87 ppt (June 2017). This well (MW-6) was shut down by Aquarion in August 2017. PFCs concentrations in several other supply wells in the Aquarion system also increased 2 to over 3-fold between 2016 and 2017 but are below the New Hampshire Ambient Groundwater Quality Standard (AGWQS). This information either suggests migration from Coakley into the supply wells or from another unidentified source. PFCs has also been detected in excess of Vermont criteria in several private residential wells in North Hampton indicating migration into North Hampton from Coakley Landfill as shown on the DES figure presented in Appendix D.

PFCs compounds were also detected in several private drinking water wells in excess of Vermont criteria in Rye, however, regulators have indicated that the town of Rye is responsible for conducting sampling of these wells due to the PFCs detected in wells around the Breakfast Hill Road landfill up to approximately 80 ppt.

Surface Water Contamination Findings:

Surface water contamination of brooks adjacent to Coakley Landfill has been documented historically (Appendix D NOAA report). There are four waterways that originate adjacent to Coakley Landfill including; Norton Brook, Little River, Bailey's Brook and Berry's Brook. Surface water samples were collected by Conservation Law Foundation (CLF) in response to concerns about contamination in the brooks adjacent to the landfill, flooding of the railbed and lack of attention to the issues by regulators. The samples were collected with private funds.

The DES confirmed the CLF results with their own sampling event which showed even higher concentrations in Berry's Brook about a month later. After many requests, the Agencies still have not yet compelled the responsible parties (CLG) to fully evaluate the concentrations of PFCs in any of the brooks that originate from the area on the west side of Coakley dump.

The concentrations of one PFCs, perfluorononanoic acid (PFNA), was detected in Berry's Brook on now three occasions at very high concentrations, some of the highest in the world. PFNA detected in surface water around Coakley are of concern (Appendix D). The concentrations detected have ranged from 170 parts per trillion (ppt) to 308 ppt (most recently) in the samples collected by CLG. As publicly stated this concentration is one of the highest detected anywhere so far. Even at Pease, the highest concentration of PFNA in groundwater and drinking water is in the tens of ppt not the hundreds. Concentrations of PFOA and PFOS also exceed site specific screening levels calculated by USEPA. PFOA and PFOS were detected in several samples collected by CLF and DES far downstream of the landfill in Rye and Portsmouth (Appendix D).

In response to concerns about the toxicity of PFNA, the state of New Jersey Department of Environmental Protection (NJDEP) recently proposed a separate maximum contaminant limit (MCL) of 13 ppt for PFNA (http://www.njspotlight.com/stories/17/08/08/nj-leads-nation-with-plan-to-curb-two-toxic-chemicals-in-drinking-

water/) . During the process of determining the need for this proposal, the state of New Jersey conducted sampling, evaluated levels of PFNA in New Jersey surface waters and conducted a literature review of available data for PFNA internationally. (do we have a copy of this to attach) The following is a quote from a comprehensive review of scientific data published in 2012 by the Delaware River Basin Commission (DRBC): 'Perfluorononanoate (PFNA) at a maximum of 976 ng/L was the PFC with the highest concentrations in the DRBC surveys (Table 9) (http://www.state.nj.us/drbc/library/documents/contaminants-of-emerging-concernAug2013rev.pdf). Figure 6 shows the distribution of PFNA in the tidal river. The highest concentrations occur between RM 68.1 and 80.

The concentrations found are higher than the 0 to 6 ng/L concentrations of PFNA found in streams of an industrial area in Korea (Rostkowski et al., 2006) and levels measured in the Conasauga River (maximum level at 32.8 to 369 ng/L) near carpet manufacturing facilities in Georgia, USA (Konwick et al., 2008).'

The recent detection of 308 ppt detected in Berry's Brook is approximately tied for 2nd highest ever detected (369 ppt) in the Conasauga River near a carpet manufacturing facility where they dumped adhesives directly in the river (https://www.ncbi.nlm.nih.gov/pubmed/18419175).

Another useful reference to this issue is data presented by the DRBC in 2009 showed that PFNA concentrations were detected at elevated concentrations in fish tissue indicating that PFNA bioaccumulates in fish (http://www.state.nj.us/drbc/library/documents/emerging-contaminants_nov2009.pdf).

In a report issued by the New Jersey Drinking Water Quality Institute (NJDWQI) in 2015 surface water, there is the following quote 'In 2007−09, PFNA was found in the Delaware River water at up to 976 ng/L starting near and downstream of the discharge location of the above-mentioned industrial facility [Solvay, West Deptford, New Jersey]; this is higher than the surface water concentrations elsewhere in the U.S. and worldwide in studies located in the literature. Elevated levels of PFUnDA (C11), a component of the Surflon S-111 mixture used at the facility, were also found in the Delaware River at these same locations' (DRBC, 2012) (https://www.ncbi.nlm.nih.gov/pubmed/18419175). A similar quote is also found in a peer-reviewed paper published in Environmental Science & Technology (ES&T) in 2013 entitled 'Occurrence of Perfluorinated Compounds in Raw Water from New Jersey Public Drinking Water Systems' by Gloria B. Post, Judith B. Louis, R. Lee Lippincott, and Nicholas A. Procopio" (http://pubs.acs.org/doi/abs/10.1021/es402884x).

Data Gaps:

There is much that is currently unknown about the landfill such as the nature and vertical and lateral extent of known contaminants in groundwater. Additionally, the migration time frames and pathways of contaminants in groundwater are not well understood. EPA concludes in the Five-Year Report (2016) that data gaps preclude the ability to determine the protectiveness of the remedial measure (). Data gaps include, among others, the need to identify the extent of contamination to the northwest, southwest and east.

A data gap includes the need for more complete characterization of contamination in the four surface water bodies that originate near Coakley Landfill which include Berry's Brook, Little River, Norton Brook and Bailey Brook. In addition, levels of chemicals in fish tissue that are taken for human consumption are unknown.

Cancer Types and Incidence in the Seacoast:

Historically, residents of the seacoast reported to regulators the elevated incidences of cancers in North Hampton. Residents felt the cancers were related to private well water contaminated by Coakley Landfill which was proven to have elevated levels of VOCs. Health studies were performed by the CDC and health departments which concluded that there were no elevated rates of cancers in this area (Appendix E). However, residents continue to report cancers in residents of the area at elevated rates.

Incidences of RMS, PPB and brain cancers in children are elevated in the 5-town area. In addition, according to the CDC, the incidence of breast cancer is the highest in Rockingham County in the entire country. Elevated incidences of bladder and prostate cancers are also reported in the seacoast of New Hampshire. Concerns relating to elevated rates of pancreatic cancers in adults in Rye have been reported to the DHHS several times. NH DHHS presented information regarding pancreatic cancer rates at a meeting in Rye.

RECOMMENDATIONS

1) Since the current selected remedy of Monitored Natural Attenuation (MNA) is ineffective for controlling migration of PFCs into surface water, remediate Coakley Landfill site and mitigate PFC-contaminated discharge to surface waters within the next two years.

2) Monitor private drinking water wells twice a year until a public water supply is provided to the area for homes with private wells where PFCs are equal to or greater than a total of 18 ppt of PFOA and PFOS in the following locations:

   a) Breakfast Hill Road and adjacent developments within a 2-mile radius of the GMZ.
   b) North Hampton within a 2-mile radius of the GMZ.
   c) Test all large groundwater withdrawals (LGWs) within a 1-mile radius of the GMZ for PFCs on at least an annual basis.
   d) Provide residents within 1 mile of the GMZ with drinking water, as soon as possible, as a proactive measure where PFCs exceed a total of 20 ppt for PFOA and PFOS until an alternate water supply or permanent solution is implemented.
   e) Continue to facilitate arrangements between the State MTBE fund, the City of Portsmouth and Town of Greenland to provide a permanent, reliable water supply for approximately 300 homes along Breakfast Hill Road.
   f) Continue to monitor developments relating to PFC contamination of wells operated by public water suppliers to the towns of Hampton, Greenland, North Hampton and Rye.

3) Recommend that NHDES shall require monthly testing of identified public water systems in Greenland, Rye, North Hampton, and Hampton where PFCs have that have been detected at a level of greater than or equal to 18ppt.. NHDES shall also do its own testing once a year of those public water systems with PFCs and other contaminants, as appropriate, have that have been detected at a level of greater than or equal to 18ppt.

4) NHDES and USEPA should provide the new Commission with responses to the recommendations found in this report, as soon as possible.

5) EPA and NHDES will provide the Commission with correspondence between regulators and responsible parties as they are received or sent between the agencies and responsible parties including but not limited to:
   a) Data relative to groundwater quality.
   b) Data relative to drinking water quality.
   c) Correspondences between regulators and responsible parties will also be summarized in monthly updates to the Commission and the Community.

6) Conduct testing for contaminants known to be related to Coakley Landfill to the full extent of Norton Brook, Bailey's Brook and Little River. Also in Berry's Brook specifically at, but not limited to, four other existing crossings: US Rte. 1, Lang Road, Sagamore Road and at the bridge on Brackett Road.

7) Conduct testing of the fish in Berry's Brook and other waterways that originate near Coakley Landfill for PFCs. Consider if fish advisories should be made and publicly posted and/or fish stocking discontinued. Evaluate fish sample analysis results in light of fish advisories enacted by Michigan.

8) Educate and inform town government and the public about exposures to contaminated drinking water and present unbiased scientific evidence of public health outcomes in Hampton, Rye, North Hampton, Portsmouth and Greenland. Educate the public on incidences of cancers in the State of New Hampshire using CDC data.

9) Consider any conflict of interest between:
   a) the governing body and the testing of Rye community water, Grove Road Landfill and Breakfast Hill Landfill monitoring wells;
   b) the board of CLG and its members;
   c) EverSource (formerly Public Service of New Hampshire) currently attempting to purchase Aquarion Water Company which supplies water to Hampton, North Hampton and portions of Rye;
   d) any other conflicts of interest identified;
   e) in the event that a conflict of interest is suspected, recommend a resolution, as appropriate.

10) Continue to seek identification of content in Coakley, Breakfast Hill and Grove Road landfills. Consider expanding to other landfills within the cancer cluster area. The chemical composition of the incinerator ash waste placed in Coakley Landfill, Breakfast Hill and Grove Road Landfills is largely unknown. Samples of the contents should be collected and analyzed for a full suite of parameters, including but not limited to, semi-volatile organic compounds, dioxins, furans, metals, PFCs and radionuclides.

11) Groundwater, Drinking water and Surface Water Quality Standards
   a) At least annually, require DES to update current ambient groundwater quality standard for PFCs or other emerging contaminants, if identified, with justification for levels;
   b) Require DES to initiate rulemaking for a maximum contaminant level (MCL) for PFCs in drinking water;
   c) Require DES to review available peer reviewed data; and,
   d) Require DES to initiate rulemaking for a surface water standard for PFCs.

12) Investigate whether the Groundwater Management Zone (GMZ) should be expanded to the North, South, East and West.

13) Assess temperature gradients along the full length of surface water bodies likely to receiving contaminated recharge from overburden and/or bedrock groundwater to determine potential connection of drinking water to contaminant sources. Conduct pore water testing at likely recharge points to assess contaminant sources.

September 17, 2017 Final Report

Coakley Landfill Subcommittee of the Governor's Task Force on the Cancer Cluster

Signed _____, Subcommittee Chair Mindi Messmer, Rep Dist. 24

Nancy Stiles

DAVID GORDEN

APPENDICES

A. Subcommittee's Interim Report December 2016

B. Presentations
   i. New Hampshire Department of Environmental Services (NHDES)
   ii. United States Environmental Protection Agency (USEPA)
   iii. United States Geological Services (USGS)
   iv. Subcommittee Chair

C. Supplemental Information, Signs and Maps
   i. Map of oil-soaked debris location
   ii. Other State contaminant limits
   iii. EPA map from PA
   iv. Copy of the cautionary sign posted
   v. Coakley Land Fill and area map
   vi. Aquarion Data Hampton wells

D. Correspondence
   i. NHDES' Postcard Survey
   ii. North Hampton request and reply for operation of the landfill in 1971
   iii. 1972 Agreement for use of landfill
   iv. Refuse to Energy correspondence
   v. 1983 Memo re: "Complaint Regarding a Mobile Home Expansion in North Hampton"

vi. April 3, 1986 Inter-Department Communication to Michael Robinette from Dana Brisbee, Esq. Attorney General's Office
vii. January 20, 1986 Letter from NHDES to Mr. Stanley Knowles, North Hampton BOS
viii. April 24, 1987 Inter-Department Communication to William A. Healy from Harry T. Stewart re: Groundwater Permit for Sanitary Landfill, Breakfast Hill
ix. Unknown Date NHDES Environmental News re: contamination in surface waters
x. March 1, 1990 Inter-Department Communication to Sarah Pillsbury from Charlie Meyers re: Rye Draft Work Plan for Hydrogeological Site Investigation at the Groves Road Landfill
xi. 1992 Consent Decree
xii. Municipal Good Faith Offer (1991), parts 1 and 2
xiii. CLG Participation Agreement (1991)
xiv. EPA Region 1 Proposed Plan, May 1994
xv. EPA Management of Migration RI/FS, prepared by CDM Federal Programs, May 1994
xvi. Drinking Water Reports
xvii. Draft Perfluorinated Compounds Release Response, Site 8 Investigation Report, Former Pease Air Force Base, April 25, 2016.
xviii. Legislators correspondence and Responses
xix. Surface Water Contamination
    1. NOAA report
    2. Conservation Law Foundation testing results
    3. NHDES Results
xx. EPA Community Updates
xxi. March 30, 2017 Memo: "Health Effects Summary for Perfluoroalkyl Substances..."

E. Historical Documentation
i. Federal Register Listing
ii. Public Health Survey
iii. Ash Testing Results

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For a thriving New England

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September 19, 2017

Via Electronic and U.S. Mail
Ms. Melissa Taylor
Office of Site Remediation and Restoration
EPA New England
5 Post Office Square
Mail Code: OSSR07-4
Boston, MA 02109-3912

Re: Migration of PFASs from Coakley Landfill, Rockingham County, NH

Dear Ms. Taylor:

I am writing to reiterate Conservation Law Foundation's (CLF) concerns regarding the migration of poly and perfluorinated alkyl substances (PFAS) from the Coakley Landfill site in Rockingham County, New Hampshire into nearby surface waters – particularly Berry's Brook – and through groundwater to local wells. CLF is greatly concerned about the imminent and substantial endangerment of the environment and the public health posed by these highly persistent and bioaccumulative contaminants.

As you know, in late 2016, CLF engaged in the sampling of surface waters near the Coakley Landfill, revealing the presence of perfluorooctanoic acid (PFOA) in the Little River, and both PFOA and perfluorooctanesulfonate (PFOS) in Berry's Brook.[1] Since the time of CLF's initial water quality monitoring, sampling by the New Hampshire Department of Environmental Service (NHDES) and by CES Inc. on behalf of the Coakley Landfill Group have revealed troublesome conditions that include:

- combined concentrations of PFOA and PFOS in Berry's Brook as high as 1250 ppt in December 2016;
- combined concentrations of PFOA and PFOS in Berry's Brook exceeding 1000 ppt at multiple locations in the spring of 2017, with one such location reaching a level of 1521 ppt;
- combined concentrations of PFOA and PFOS reaching a level of 2586 ppt at leachate seep location L-1;
- the presence of other PFASs in surface waters, including perfluorononanoic acid (PFNA), which has been found in concentrations that are considered extremely high for that contaminant (as high as 308 ppt).

In addition to being found in high concentrations in nearby surface waters, PFOA and PFOS have been found to be present in samples of private wells.

[1]CLF's sampling in November 2016 revealed the presence of PFOA the Little River at a concentration of 10.9 parts per trillion (ppt), and the presence of PFOA and PFOS in Berry's Brook at a combined level of 194.0 ppt. CLF's sampling of Berry's Brook in December 2016 revealed combined PFOA and PFOS levels as high as 269 ppt.

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On July 7, 2017, NHDES issued correspondence to several New Hampshire legislators stating that "the migration of contaminants from site groundwater to surface water and the resultant impacts on Berry's Brook are unacceptable and need to be addressed."[2] Its correspondence further stated: "NHDES believes that actions need to be implemented at the [Coakley] site to provide additional removal or containment of the contamination, in order to mitigate these surface water quality impacts. In the long run, this will be the most reliable way to limit exposure to site contaminants."[3]

On July 27, 2017, CLF participated in a meeting with EPA, NHDES, a number of state legislators, and representatives of U.S. Senators Shaheen and Hassan. During that meeting, EPA stated that it will be meeting with the Coakley Landfill Group to advance a Remedial Investigation relative to deep bedrock conditions at the Coakley site and that it also will be discussing with the Coakley Landfill Group further remediation to address the migration of PFASs. However, EPA also stated its view that its authority to require further action related to PFASs is limited because PFASs are not specifically listed as "hazardous substances" within the meaning of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA"), 42 U.S.C. § 9601 *et seq.*

CLF supports EPA's efforts to advance a Remedial Investigation of deep bedrock conditions and further remediation, with an emphasis on treatment strategies to contain and eliminate the migration of PFASs, but we strongly disagree with EPA's interpretation of its regulatory authority. Contrary to EPA's constrained view of its authority, CERCLA § 104(a) authorizes EPA to act "[w]henever . . . there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare. . . ." 42 U.S. C. § 9604(a). Such action – which by the clear language of CERCLA § 104(a) is not limited to "hazardous substances" within the meaning of the Act – includes removal and remediation of the "pollutant or contaminant" by EPA or by any responsible party deemed qualified by EPA to complete the necessary work "properly and promptly." *Id.*

In addition to the above authority under CERCLA, the Resource Conservation and Recovery Act ("RCRA") authorizes EPA (as well as citizens[4]) to pursue actions when "any solid waste . . . may present an imminent and substantial endangerment to health or the environment." RCRA § 7003(a), 42 U.S.C. §

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[2] Corresp. from Michael J. Wimsatt, P.G., Director, NHDES Waste Management Div. to NH Rep. Mindi Messmer, NH Sen. Martha Fuller Clark, and nine additional NH legislators (July 7, 2017).
[3] *Id.*
[4] RCRA§ 7002, which contains the Act's provisions pertaining to citizen suits, provides that any person may commence a civil action against any person – including the United States and any past or present generator, transporter, or owner or operator of a disposal facility "who has contributed or who is contributing to the past or present handling, storage, treatment, transportation, or disposal of any solid or hazardous waste which may present an imminent and substantial endangerment to health or the environment. 42 U.S.C. § 6972(a). *See also Maine People's Alliance v. Mallinckrodt, Inc.*, 471 F.3d 277, 295-296 (1st Cir. 2006) (noting "expansive reading of the 'imminent and substantial endangerment' standard for liability under RCRA §7002(a)(1)(B)" and stating: "the combination of the word 'may' with the word 'endanger,' both of which are probabilistic, leads us to conclude that a reasonable prospect of future harm is adequate to engage the gears of RCRA§7002(a)(1)(B) so long as the threat is near-term and involved potentially serious harm.").

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6973(a). Moreover, the 1991 Consent Decree entered between the United States, State of New Hampshire, and the Settling Defendants in EPA's Coakley Landfill action fully preserves EPA's rights "to take, direct, or order all appropriate action or to seek an order from the Court to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site." Consent Decree at 50, ¶ 54.[5] *Id.* at 12.

We understand that EPA will be meeting with the Coakley Landfill Group on September 21. We greatly appreciate and wholeheartedly agree with NHDES's determination that the migration of PFASs from Coakley into Berry's Brook is unacceptable and needs to be addressed. We also appreciate EPA's intent to proceed with a Remedial Investigation and to explore further remediation, but we urge EPA to pursue those actions without hesitation and with the understanding that pursuant to CERCLA, RCRA and the governing Consent Decree, it has full authority to mandate action related to PFASs. We urge EPA to exercise that authority through a Section 106 order or administrative consent order, with an enforceable schedule to expeditiously eliminate the imminent and substantial endangerment of the environment and the public's health posed by the migration of these contaminants from the Coakley Landfill.

Sincerely,

Tom Irwin
V.P. and CLF New Hampshire Director

cc: Deborah Szaro, Acting Administrator, EPA New England
Bryan Olson, Director, Office of Site Remediation & Restoration, EPA New England
Gerardo Milan-Ramos, EPA New England
James Murphy, EPA New England
Robert R. Scott, Commissioner, NHDES
Michael Wimsatt, Director, Waste Div., NHDES
The Hon. Martha Fuller Clark, NH Senate
The Hon. Mindi Messmer, NH House of Representatives

[5]The Consent Decree does not limit the term "Waste Material" to CERCLA hazardous substances, but also includes "any 'solid waste' under Section 1004(27) of RCRA," *see* Consent Decree at 12, which defines "solid waste" broadly as meaning:

> [A]ny garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 1342 of Title 33, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended.

42 U.S.C. § 6903(27). The Consent Decree's definition of "Waste Material" also includes "hazardous wastes" as defined by RCRA. *See* Consent Decree at 12.

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United States Environmental Protection Agency
ADDENDUM TO FOURTH FIVE-YEAR REVIEW REPORT DATED SEPTEMBER 23, 2016
Coakley Land ill Superfund Site North Hampton, New Hampshire EPA ID: NHD064424153

https://semspub.epa.gov/work/01/622624.pdf

Appendix G

Pease Air Force Base

The following summary was submitted by several members of the Pease Community Advisory Board:

Pease Tradeport Water Contamination Summary

August 8, 2017

Background:

Pease was an active Air Force Base (AFB) from 1956 until 1991 when it officially closed under the Base Realignment and Closure Act (BRAC).[1] Today the former Pease AFB, now known as the Pease Tradeport, is one of the most successful redeveloped BRAC bases in the nation, home to over 250 businesses (including two large daycare centers) employing more than 9,000 workers. Pease AFB was officially listed as a National Priority List (NPL) Superfund Site on February 21, 1991.[2] The Pease Tradeport received drinking water from three wells located on Pease known as the Smith, Harrison, and Haven wells. In May 2014, elevated levels of Per- and polyfluoroalkyl substances (PFAS) were discovered in the Haven well located on the Pease Tradeport and the well was closed immediately.[3] PFASs were also discovered in the Smith and Harrison wells, but at much lower concentrations than the Haven well and those two wells have remained online and continue to supply drinking water to the Pease Tradeport. The source of the PFASs found at the Pease Tradeport are from the Air Force's use of firefighting foam known as Aqueous Film-Forming Foam (AFFF).

Health Concerns and Action:

In 2015, approximately 1578 community members (1212 adults and 366 children) participated in a PFAS blood testing program offered by NH DHHS. Those results found that concentrations of PFAS in blood from the Pease community were 2 to 3 times higher, on average, compared to the general population. Also, concentrations of one PFAS (PFHxS) was higher than the majority of the general population for 40% of those tested at Pease.[4] The blood testing program re-opened to Pease community members and since 2016, an additional 257 blood samples have been received by NH DHHS from exposed community members.[5] In response to concerns from the community and a request to be more involved in the process addressing the PFAS contamination at Pease, a Community Advisory Board (CAB) met from May 2015 through December 2015 and hosted community meetings focusing on the PFAS contamination.[6] In October 2015, the CAB met with members from the federal health agency known as the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is a federal public health agency that works with communities that have been impacted by environmental contamination and investigates emerging environmental health threats, conducts research on the health impacts of hazardous waste sites, and provides actionable guidance to state and local health partners.[7] After the CAB dissolved in December of 2015, ATSDR formed a Pease Community Assistance Panel (CAP) in March of 2016 as a way for the community to participate directly in ATSDR's health activities. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been exposed to hazardous substances, and inform ATSDR on how to involve the community.[8] In 2017, ATSDR issued a feasibility assessment discussing in detail feasible health studies of the exposed community members at Pease.[9] ATSDR has received over 100 comments from Pease CAP members and CAP scientific advisors on the feasibility assessment. At a Pease CAP meeting in May 2017, a Colonel from the Air Force shared a statement from the Air Force claiming not to have the authority to fund the health studies of the Pease population deemed feasible by ATSDR.[10] The community awaits a funding source to move forward with these studies, but remains optimistic due to recent legislation proposed at the federal level to direct DoD to fund a national health study. In June 2017, U.S. Senator Jeanne Shaheen introduced a bipartisan amendment that would direct DoD to fund a nationwide health study on implications of PFAS chemicals in drinking water.[11] In July 2017, the U.S. House of Representatives unanimously adopted an amendment written by Congresswoman Carol Shea-Porter (NH-01)

appropriating $7 million to launch a national health impact study of sites like Pease affected by the U.S. military's historic use of PFAS.[12]

Environmental Concerns and Action:

In 2015, the Air Force was issued an Administrative Order by EPA under the Safe Drinking Water Act to investigate and remediate PFAS sources, restore the Pease aquifer, treat the Haven well, and monitor and protect residential and water supply wells.[2] In April 2015, the Air Force reinstated a Restoration Advisory Board (RAB) which is a stakeholder group that meets quarterly to discuss ongoing environmental restoration of Pease. The RAB provides community members an open forum to talk with the Air Force and regulatory agencies about environmental restoration activities. In September 2015, the Air Force agreed to treat all three wells at the Pease Tradeport. In September 2016, two large granulated activated carbon (GAC) filters were installed to filter and remove PFASs from the Harrison and Smith Wells at the existing Grafton Road water facility at the Pease Tradeport. Final data and design plans for the Haven treatment system are planned for Spring 2017, with construction of this system anticipated to commence in the Fall of 2017.[13] In November 2016, the Air Force released plans to install two large-scale groundwater treatment systems to protect drinking water supply wells on and near the former Pease Air Force Base from further PFAS contamination, with the goal of bringing the Haven well back on line for the Pease water supply.[14] Water monitoring currently includes a standard panel of PFASs, but does not include all PFASs that have been identified in AFFF-contaminated drinking water.[15] This is of concern as GAC filtration has been shown to be less effective for some PFASs not currently monitored.[16]

Conclusion:

There has been a significant amount of effort and action surrounding the PFAS contamination at the Pease Tradeport since it was first discovered in 2014 by multiple local, state, and federal agencies and the impacted community. The efforts to address the community's health concerns have been blood testing provided by NH DHHS and a feasibility assessment on possible health studies conducted by ATSDR, but health studies are on hold at this time due to the lack of a funding source. The current pathway through which health concerns are being addressed is the Pease CAP, working in coordination with ATSDR. The efforts to address the environmental contamination have been routine water samples, installation of two large GAC filters on the Smith and Harrison wells, and plans for two large scale groundwater treatment systems on Pease. The Air Force RAB is the current pathway the environmental concerns are being addressed.

Recommendations:

- Secure a funding source for proposed health studies recommended by ATSDR
- Develop a medical monitoring tool for the healthcare community as a way to monitor health, provide education re: possible adverse health effects, and screen for/diagnose adverse health effects early on to limit the disease progression. Such monitoring should consider recommendations from the C8 science panel and ATSDR.[17, 18]
- Monitor concentrations of PFAS pre- and post-GAC filtration to ensure the Pease community continues to be provided non-detect levels of PFAS in drinking water supplied by the wells at Pease. While the EPA health advisory level includes only PFOA and PFOS it should be assumed, until proven otherwise, that other PFAS can act cumulatively on human health. Within the next year this monitoring should include the full suite of PFAS' identified in AFFF-contaminated drinking water.
- Monitor off-site migration including local residential communities with private wells and potential impacts on local fisheries and wildlife.
- Test for PFASs in an old water source identified by NH DES on the Pease Tradeport in efforts to obtain historical PFAS levels to assist with better understanding historical levels of PFAS in water on Pease.

References:

1) SAC Bases: Pease Air Force Base. Retrieved August 8, 2017 from, http://www.strategic-air-command.com/bases/Pease_AFB.htm

2) Former Pease Air Force Base Newington/Portsmouth, NH DES. Retrieved August 8, 2017, https://www.des.nh.gov/organization/divisions/waste/hwrb/fss/superfund/summaries/documents/pease.pdf

3) Table 1 April and May 2014 PFC Analytical Results Pease Public Water Supply Former Pease AFB Portsmouth, New Hampshire. Retrieved August 8, 2017 from, http://cityofportsmouth.com/publicworks/PeaseWellPFCSamplingAprilandMay%202014.pdf

4) State of New Hampshire Department of Health and Human Services Division of Public Health Services Pease PFC Blood Testing Program: April 2015 – October 2015. Pease Tradeport Portsmouth, NH (2016, June 16). Retrieved August 8, 2017, from https://www.dhhs.nh.gov/dphs/documents/pease-pfc-blood-testing.pdf

5) New Hampshire PFC Testing Program Data: July 15, 2016 - June 13, 2017. Retrieved August 8, 2017, from https://www.dhhs.nh.gov/dphs/pfcs/blood-testing.htm

6) Community Advisory Board - Haven Well. Retrieved August 8, 2017, from http://cityofportsmouth.com/CommunityAdvisoryBoardHavenWell.html

7) Agency for Toxic Substances and Disease Registry (2017, July 17). Retrieved August 8, 2017, from https://www.atsdr.cdc.gov/

8) Pease International Tradeport Site (2017, July 13). Retrieved August 8, 2017, from https://www.atsdr.cdc.gov/sites/pease/cap.html

9) Feasibility Assessment for Epidemiological Studies at Pease International Tradeport, Portsmouth, New Hampshire (2017, May 23). Retrieved August 8, 2017, from https://static1.squarespace.com/static/565b6fe8e4b0f0c1a028adc4/t/59259767f5e2312a3e6597fd/1495635819167/Feasibility+assessment+draft+for+Pease+CAP_5_23_17.pdf

10) Pease Community Assistance Panel Video (2017, May 30). Retrieved August 8, 2017, from https://www.youtube.com/watch?v=RHZ6zU8cYMI

11) Press Release: Shaheen Priorities Included in Committee-Approved Defense Bill (2017, June 28). Retrieved August 8, 2017, from https://www.shaheen.senate.gov/news/press/06/28/2017/shaheen-priorities-included-in-committee-approved-defense-bill

12) Press Release: House Adopts Shea-Porter Amendment Authorizing $7 Million for PFC Health Study (2017, July 27). Retrieved August 8, 2017, from https://shea-porter.house.gov/media/press-releases/house-adopts-shea-porter-amendment-authorizing-7-million-pfc-health-study

13) Press Release: Portsmouth announces upgraded water filtration at Pease Tradeport (2016, September 23). Retrieved August 8, 2017, from http://cityofportsmouth.com/press/PressRelease_PeaseWaterFiltration.pdf

14) Press Release: Air Force moves forward to build treatment systems (2016, November 1). Retrieved August 8, 2017, from http://www.afcec.af.mil/News/Article-Display/Article/992396/air-force-moves-forward-to-build-treatment-systems/

15) Barzen-Hanson KA, Roberts S, Choyke S, Oetjen K, McAlees A, Riddell N, McCrindle R, Ferguson LP, Higgins CP, Field JA. (2017). "Discovery of 40 Classes of Per- and Polyfluoroalkyl Substances in Historical Aqueous Film-Forming Foams (AFFFs) and AFFF-Impacted Groundwater." Environmental Science & Technology.

16) Xiao X, Ulrich BA, Baoliang C, Higgins CP. (2017). "Sorption of Poly- and Perfluoroalkyl Substances (PFASs) Relevant to Aqueous Film-Forming Foam (AFFF)-Impacted Groundwater by Biochars and Activated Carbon." Environmental Science & Technology **51**(11): 6342-6351.

17) Medical Panel for the C-8 Class Members (2013, November 18). Information on the C-8 (PFOA) Medical Monitoring Program Screening Tests. Retrieved August 8, 2017, from http://www.c-8medicalmonitoringprogram.com/docs/med_panel_education_doc.pdf

18) ATSDR (Agency of Toxic Substances and Disease Control Registry (2017, June 07). An Overview of Perfluoroalkyl and Polyfluoroalkyl Substances and Interim Guidance for Clinicians Responding to Patient Exposure Concerns. Retrieved August 8, 2017, from https://www.atsdr.cdc.gov/pfc/docs/pfas_clinician_fact_sheet_508.pdf

Appendix H

PUBLIC SUBMISSIONS

The Task Force wishes to thank the many members of the public who attended and actively participated in our meetings and those of the community groups and subcommittees. The Task Force greatly valued this participation and therefore invited the public to submit comments and concerns to the Task Force to be included in this report.

From Michelle Dalton:
Durham, NH
9/6/17 Task Force Meeting
Testimony

My name is Michelle Dalton and my family has been directly affected by the PFAS water contamination at the former Pease Air Force Base. I speak today as a concerned mother and community member. I have been exposed to the contaminated water since January 2011 when I began working on Pease. My son, now 4, was exposed from the time he was conceived until 3 years old. As you can suspect, both of our blood results show elevated levels of PFAS in our bodies.

As any concerned mother would do, I brought my son and his results to his pediatrician to find out what we could do to monitor his health more closely. "Nothing" was the answer I received. His pediatrician and I continued to talk about the "more probable than not" health effects and the need to be proactive, not reactive in his health care. This is what I was told:

- The annual exams that all children receive are sufficient to monitor him
- The C8 Health Studies, recommendations and website needed to be "vetted" to make sure they were "legit"
- Their office has reviewed the guidelines and fact sheets from NH DHHS and is going off of what they recommend

I am sure you can understand my frustrations, and I am just one out of the many parents receiving this message.

My child is not like every other unexposed child, so why are the recommendations about monitoring his health the same? Unfortunately for our providers, "sufficient" is not good enough for me and it's certainly not good enough for my son. I want to know what I can do now.

The C8 Health Studies and recommendations are of sound medical science and research. In fact, just last week at the Pease CAP meeting the Director of ATSDR, Dr. Patrick Breysee, validated the C8 health studies saying "I assure you it's not illegitimate". This was in direct response to my son's pediatrician's comments.

My concern is that the NH guidelines and fact sheets are written in such a way that they are actually *preventing* parents like me from being proactive, rather than helping us. We didn't ask to be put in this situation. We didn't ask to be contaminated…but the reality is that we are. Thousands of us are. And when we try to be proactive in dealing with it, asking what we can to above and beyond the "normal" physicals, we are being denied. There is something wrong with that.

In NH we continue to give the chemical the benefit of the doubt and it's simply not working anymore. Many communities are looking at NH as a leader and we have the opportunity to be one and take medical monitoring seriously. We need to be proactive because, frankly, taking a reactive approach, the wait and see approach, is what got us in this mess in the first place.

From Alayna Davis:
9/6/17

My name is Alayna Davis and as a seacoast community member personally impacted by the PFAS water contamination at the Pease International Tradeport, I would like to offer my recommendations for the institution of a medical monitoring program for those impacted by PFAS chemicals in NH. I became actively involved in advocating for the Pease community after discovering that my young son was exposed to these emerging contaminants. I worked on Pease for several years, was pregnant while working there, and after my son was born, my husband and I enrolled him at a daycare at just 12 weeks old. I have concerns about his health now and long term due to his exposure to these persistent, bioaccumulative chemicals.

My husband and I were devastated to see that after having my son's blood tested, that he has elevated levels of PFAS, the highest being PFHxS (which has a half-life of up to 9 years). A lot of time and thought went into who would care for our son – but we never thought that despite the many healthy choices we were making for his development, that he would be ingesting toxic chemicals while he was developing and growing every day.

We have concerns about his health because the CDC states that "Children are especially vulnerable to environmental contaminants due to their rapid development during the fetal period through early childhood. Children continue to be vulnerable as they go through the developmental changes of puberty." Given my son's prenatal exposure which continued until he was 5 1⁄2 years old, it could take decades for his body to begin eliminating these chemicals from his body.

As I sit here with him at home, only two days after he started school, and he is sick on the couch with high fevers, headache and vomiting - questions race through my mind yet again about whether his early exposure to PFAS during critical stages of his body's development has compromised his immune system. It is not unusual for him to catch the latest wave of germs and for his body to go through periods of 5-7 days of high fevers as he fights off a virus. When I have mentioned to other parents what his "normal" fever level is, they state that their children have never had a fever that high. Last year, he was out of school for a week and a half fighting off pneumonia. I share this with you this because after we received my son's PFAS blood test results, I provided them to his doctor's office and requested to have a consultation with them about what we could do to regularly monitor his health for what is known about potential negative impacts from PFAS. As a result of my request to discuss my child's blood test results, I received a brief 5 minute phone call from one of his physicians where I was told that they would not do any additional monitoring because according to the NH DHHS, there is no medical indication to do so.

Years prior to becoming pregnant, I began making careful choices about what I ate, drank and used for personal care products. I educated families on what to avoid for common, everyday environmental toxins. Yet, without knowing it, I nursed him with contaminants and later he drank contaminated water daily as he attended daycare. Superfund sites are in our backyards, with documented releases of PFAS where our kids are playing. The EPA confirms that the "developing fetus and newborn are particularly sensitive to PFOA and PFOS-induced toxicity". The National Toxicology Program concluded that there is strong evidence that both PFOS and PFOA are immune hazards to humans. Other evidence indicates that PFCs have negative effects on the body's endocrine system, the system that regulates our growth, development and impacts almost every major function in our body. Studies were conducted of 69,000 people exposed to one PFAS (PFOA) for just one year at levels *seven times lower* than what was found in the Haven well at Pease. For six disease categories, that Science Panel concluded that there was a

Probable Link to C8 (PFOA) exposure for high cholesterol, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer, and pregnancy-induced hypertension. Through these studies, the researchers were able to establish a medical monitoring protocol for those who were exposed to PFOA. At Pease, my family was exposed to several types of PFAS, with the research still emerging about how they may be very similar in regard to their health implications.

Due to his exposure to PFAS occurring prenatally and beyond, the most harmful impacts of these contaminants could take years to show up, long after the exposures occurred. I would not wish the uncertainty and worry that I have experienced from finding out that my son was drinking contaminated water on ANY other family. I was unable to protect my child from the harmful impacts of drinking water on Pease, but I need to do what I can now to protect him and be proactive about monitoring his health. With a pediatric cancer cluster evident on the seacoast and other emerging cancers in this area, please consider families like mine when you consider the recommendations of establishing a medical monitoring protocol for those impacted by PFAS here in NH and how important it is for our peace of mind.

Thank you for the opportunity to provide comments.
Alayna Davis Co-Founder of Testing for Pease

Also from Alayna Davis:

In addition, I would like to add that health care provider lack of knowledge on PFAS exposures has been a very concerning limitation over the last few years with Pease in terms of being able to address community members' health concerns about our exposures. I have experienced this first hand, and many other community members have expressed their frustrations with their physician's lack of experience on PFAS. Many of us have had to educate and inform our doctors about the current research on PFAS and the potential impacts currently known regarding PFAS drinking water contaminations (due to their lack of training and knowledge on the subject). More and more communities have discovered releases of these chemicals, making it a larger, worldwide concern - preparing our clinicians through proper education would only be a positive step in the right direction in trying to prevent the reach of their potential harmful impacts.

In my experience as an impacted community member (and with my advocacy efforts as a co-founder of Testing for Pease), I think it is critical to establish a physician curriculum/protocol to raise awareness about PFAS and their environmental risks, so that the impacts due to our exposure can be reduced or prevented through the work of educated and informed clinicians. Although many community members have become self-educated about PFAS and their impacts - without our physicians support in tracking our health, the education has no value in terms of being able to follow through with that knowledge. Proper healthcare provider education can go a long way and I feel it is essential to the many NH families impacted and their ability to take care of their families given their unfortunate situation.

From Lindsey Carmichael, MPH:

At the Task Force meeting this afternoon I spoke in favor of including a recommendation for medical monitoring in the Task Force summary document. I've included the salient points in the text below.

I am a Portsmouth resident and serve on the Pease CAP. I am also the mother of a child who was exposed to water that was unsafe to drink. Between the years of 2002 and 2007 I worked at the Pease Tradeport and my son attended day care there. During that time my son drank water contaminated with PFCs. As has been discussed previously on the Task Force, exposure to PFCs are correlated with a list of adverse health effects. It remains to be seen if my son will develop health issues related to drinking water contaminated with these chemicals. He is a healthy 16-year-old today, but any parent can likely sympathize with the anxiety I feel about his health down the road, particularly since his exposure took place during a vulnerable developmental period in his life.

As a CAP member and parent of an impacted child, my goal is to work towards minimizing the risk of adverse health effects from the PFC-contaminated water at Pease. I feel as if the most effective mechanism for achieving this goal is to have a clear recommendation for medical monitoring for the impacted community. Screenings can yield early detection of health issues, and early intervention can treat or stop disease progression.

One of the frustrations I have is that ATSDR and DHHS have adopted a neutral stance with respect to medical monitoring for those impacted by PFAS exposure. A consequence of their neutral stance is that some medical providers are not supportive of any of the C8 screening protocols for their patients. A second concern I have is that the neutral stance perhaps unintentionally downplays the health risks associated with the exposure, which can lead to parents opting out of screenings. As a community we do not want the scenario to play out that a child who was exposed to PFAS never received screenings, but later developed one or more of the probable link conditions identified by the C8 Science Panel. Screenings can play such an important role in our overall health, and I feel as if those of us with the knowledge of the C8 studies have an ethical obligation to share that information with the wider community.

I appreciate the opportunity to communicate how I feel about this important topic to the Task Force members. Thank you for all the excellent work that has been done by the Task Force to date.

From Lisa Moll:
Rye NH

Dear Honorable Chairman,

My name is Lisa Moll and I live in Rye, New Hampshire. I am writing to thank the Task Force investigating the Seacoast Pediatric Cancer Cluster. As a mother of thirteen-year-old twin girls, I am deeply troubled by the number of children diagnosed with cancer in the Seacoast, particularly rhabdomyosarcoma (RMS) and pleuropulmonary blastoma (PPB). The Seacoast is burdened by a number of environmental threats, including Coakley Landfill, Schiller coal-fired power plant, Seabrook Nuclear Station, Naval Shipyard, and the former Pease Air Force Base. Every effort the Task Force has undertaken to safeguard our children is deeply appreciated.

The Seacoast community is pleased Governor Sununu supported the creation of a permanent commission to continue the good work of the Task Force.

Many thanks,
Lisa Moll

From Paula Skelley:
Portsmouth, NH

Dear Cancer Cluster Commission,

My name is Paula Skelley and I am the mother of Lydia Valdez. Lydia is one of the children counted in the Seacoast Cancer Cluster. My hope is for the cancer cluster commission to continue its investigation until it finds a trigger or cause for this unusually high number or cases of Rhabdomyosarcoma and PPB in the NH Seacoast area.

Our home in Portsmouth is approximately one mile from Schiller Station, two miles from the Kittery Shipyard and its nuclear submarines, 3 miles from Pease Airforce base and four miles or so from Coakley Landfill. There seem to be possible environmental factors that may have played a part in my daughter's diagnosis. This commission may find answers and thereby find ways to prevent more children suffering the fate of my beautiful and brilliant daughter Lydia who died at the age of nine after battling cancer for over two years.

No parent should have to watch their child endure cancer, CT scans, MRI's, biopsies, bone marrow aspirations, Pet scans, proton therapy, radiation, surgeries, blood transfusions, platelet transfusions and chemotherapy which causes baldness, constant nausea, vomiting, diarrhea, and the possibility of much worse things like secondary cancers. And when all of this fails, no parent should have to watch their child die of cancer.

According to the National Cancer institute Cancer is the leading cause of death by disease past infancy among children in the United States. In spite of this, only four percent of the National Cancer Institute's 5 billion dollar budget goes to Pediatric cancer research. Major drug companies don't focus on pediatric cancers because it's not profitable. Maybe the best way to combat childhood cancer is to discover what triggers or causes may be in our environment.

What I lost when my daughter died from this insidious cancer is immeasurable. I don't want to see any more children suffer as my daughter did. I don't want to see another child in our community die of RMS, or any other cancer.

In addition, I feel there may be an environmental cause because a similar situation is taking place in Waycross Ga, where 4 children were diagnosed with RMS within 60 days of one another. They have several things in common with our towns: a nearby superfund site, and a nuclear plant. This is enough for me to feel as if answers can be found if the cause or trigger is environmental

Sincerely,
Paula Skelley

From Deb White:
Rye, NH

I strongly urge the Pediatric Cancer Cluster Task Force to task the Commission to focus on strategies to reduce children's cancer risk, particularly environmental exposure risk. I hope the Task Force will urge Commission members to focus on the future of our children's health. With CDC guidance, it has been established that children in our community have cancer at higher than expected rates; some families actually have two children diagnosed with pediatric cancer. These cancers were first identified in 2014. Now, three years later, we have an urgent obligation and a duty to give parents, public health officials, our communities and others direction and actions, so that we can begin to reduce this known threat to our children.

September 30, 2017

Commission on the Seacoast Cancer Cluster Investigation
State House
107 North Main Street
Concord, NH 03301

Honorable Chairman McMahon and Commission on the Seacoast Cancer Cluster Investigation members,

I write to you today to express my sincere gratitude for the commission's pledge to continue this investigation, which I am personally invested in as a member of the Seacoast community. I was born and raised on the Seacoast; my family has deep roots here. I can't imagine raising my three young daughters in any other place. Seven years ago, my family moved up from Connecticut and built our dream home in Greenland. We had the opportunity to raise our daughters near extended family and we were thrilled.

When the CDC confirmed cancer cluster, involving two rare childhood cancers, was reported by NHDHHS last February, I subsequently discovered Coakley Landfill. This National Priority List EPA Superfund site sits less than one mile from my home. In the past year and a half, I have learned more than I would care to about this toxic waste dump in my back yard. I have attended countless meetings, many of which were for the Governor's Pediatric Cancer Cluster Task Force. These meetings provided a frightened public with a forum where our concerns were discussed, researched, and validated. Many community members shared their experiences with Coakley dump. One man described his family's heartbreaking history. As a child, his son, an aspiring archeologist, played on the railroad tracks adjacent to the dump, digging in what he didn't realize was contaminated soil. He later developed adult onset RMS, one of the two rare childhood cancers in the cancer cluster, and died three years later. This is just one example of the tragic and compelling stories that have surfaced since the Coakley dump reemerged in the public eye as an imminent threat to the surrounding community.

The double pediatric cancer cluster detected in the 5 towns surrounding this toxic site is symptomatic of the threat this dump poses to the health of our great State, more specifically our idyllic tourist destination on the Seacoast. Today, we have more information about this dump and the public demands this matter continue to be investigated until a resolution is established that is protective of our collective health. It is my hope the Commission on the Seacoast Cancer Cluster Investigation will work to prevent this site from continuing to damage on our Seacoast surface water and drinking water supply, as well as our public health, wildlife, and environmental health.

Thank you again for your commitment to this important work.

Respectfully,

Jillian Lane

SEACOAST ANTI-POLLUTION LEAGUE

P.O Box 1136
Portsmouth, NH 03802
603-431-5089

September 30, 2017

Dr. Tom Sherman
Governor's Task Force on the Seacoast Cancer Cluster

Dear Dr. Sherman,

On behalf of the Seacoast Anti-Pollution League (SAPL), I would like to provide the following comments for submission in the final report of your task force. While much attention has been given to other potential pollution sources such as the Coakley Landfill (a concern we share), we will restrict our comments here to the other most significant potential source in the region of concern – the Seabrook nuclear power plant. While we raised some of these concerns in Task Force meetings and other public meetings on the subject, we continue to maintain that this source has been given short shrift in your deliberations and investigations to date.

The Seabrook plant has been operating for 27 years now, and while most of its neighbors are unaware of it, this plant and all other nuclear plants routinely emit radioactive gases and airborne particles to the local atmosphere in the regular course of their operation. They also emit waterborne radiation, mainly in the form of tritium (radioactive hydrogen, bound up in water) as well as smaller amounts of radioactive particles of cobalt, cesium and other fission by-products. While plant operators and regulators will no doubt tell you that these levels of routine radiation permitted and are of no concern for surrounding populations, we are informed by the conclusions of the National Academy of Sciences' BEIR VII report (2006), that "that there is a linear, nothreshold dose-response relationship between exposure to ionizing radiation and the development of cancer in humans." In common terms, this means that ANY radiation exposure poses some risk to human health, and that any additional increase to one's exposure is cumulative and will increase that risk. And other research indicates that it matters whether the radiation source is external or internal to one's body, as some particles (and tritium of course – see attached report) get bound up in certain tissues, organs and bones for many years.

Most of this waterborne pollution appears to end up in the cooling water effluent that goes into the Gulf of Maine, whether from direct leakage in the system or by deliberate introduction of pumped tritium-contaminated groundwater from under/around the plant site. The plant operators (and their regulators at the NRC) don't have to concern themselves with this waterborne radiation, on the longstanding assumption that "dilution is the solution." Despite our concerns with the effect on the marine environment (and perhaps our fisheries), we expect that the larger potential health concern for human residents may lie in airborne emissions.

According to plant operator reports (found at the NRC website: https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-specific-reports/seab1.html), radioactive gases such as argon, krypton, xenon and tritium are released in "batches" on a weekly or biweekly schedule from the vent on top of the containment dome. Prevailing winds (in the summer at least) are from the southwest, most likely sending these gases and particles up the coast over neighboring communities. Most of these gas isotopes have short half-lives, but unfortunately some of them thus transmute into longer-lived, more radioactive elements like strontium and cesium that are known to be deposited to key organs and tissues when ingested. (see attached factsheet for more details.)

While the current Seacoast cancer cluster investigation focuses largely on incidences from the past decade, SAPL previously worked with the Radiation and Public Health Project (RPHP) of New York to access CDC county-by-county childhood cancer data for the previous two decades. RPHP determined that there was a 19 percent increase in such cancers in counties surrounding Seabrook from the decade prior to the start-up of the Seabrook plant and its first decade of operation, while national rates for these cancers declined during this same period.

More recently, and subsequent to the identification of a childhood cancer cluster in Seacoast communities, we again contacted RPHP to look at CDC childhood cancer data for Rockingham county specifically. Again, there was evidence of an large increase in cancer mortality in comparison to the rest of the state (SMR) over this pre/post Seabrook start-up period (see RPHP data sheet attached). There was a small sample size and of course a larger region of incidence that the present study, but we think it behooves state authorities to undertake a longer-range analysis of the available cancer data to see whether this time-period discrepancy holds up or not. Given that other studies in the U.S. as well as in Europe have found similar increases in childhood cancer rates surrounding nuclear power plants, we think this issue as it relates to the current Seacoast cancer cluster should be given better scrutiny.

We hope you will incorporate these comments into your final report and pass along this information to the succeeding legislative Commission on the Seacoast Cancer Cluster Investigation. We would also be happy to discuss this information and our related concerns with the Commission when appropriate.

Sincerely,

Doug Bogen
Executive Director
Seacoast Anti-Pollution League